

THE IRON AGE

CHESTNUT AND 56TH STREETS, PHILADELPHIA, PA.
Sales Offices
 239 WEST 39TH STREET NEW YORK, N. Y.

FRITZ J. FRANK, *President*
 J. H. VAN DEVENTER
Editor
 G. L. LACHER T. H. GERKEN R. E. MILLER
Managing Editor *News Editor* *Machinery Editor*
 F. J. WINTERS T. W. LIPPERT L. M. WAITE
 A. I. FINDLEY L. W. MOFFETT R. A. FISKE F. L. PRENTISS
Editor Emeritus *Washington* *Chicago* *Cleveland*
 G. EHRNSTROM, JR. BURNHAM FINNEY GERARD FRAZAR R. G. MCINTOSH
Pittsburgh *Detroit* *Boston* *Cincinnati*

Contents — December 19, 1935

Whose Overcoat Are You Paying For?	17
Control of Cupola Operation	18
Manufacture of Copper Tubing	24
New Carnegie-Illinois McDonald Strip Mill	28
Nitricastiron Cylinder Sleeves	31
New Equipment	34
Automotive Industry	36
Washington News	40
News	45
Rate of Activity in Capital Goods	49
Statistics on Metal-Working Activity	50
Markets	51
Construction and Equipment Buying	74
Products Advertised	108
Index to Advertisers	130

C. S. BAUR, *General Advertising Manager*
 A. H. DIX, *Manager, Reader Service*

Member, Audit Bureau of Circulations

ADVERTISING STAFF

Emerson Findley, 311 Union Bidg., Cleveland
 B. L. Herman, 675 Delaware Ave., Buffalo,
 N. Y.

H. K. Hottenstein, 802 Otis Bidg., Chicago
 Pearce Lewis, 7310 Woodward Ave., Detroit
 Charles Lundberg, Chilton Bidg., Chestnut &
 56th Sts., Philadelphia, Pa.

C. H. Ober, 239 W. 39th St., New York
 W. B. Robinson, 428 Park Bidg., Pittsburgh
 W. C. Swezey, 239 West 39th St., New York
 D. C. Warren, P. O. Box 81, Hartford, Conn.

Owned, Published and Copyrighted, 1935,
 by



CHILTON COMPANY
(Incorporated)

Executive and Publication Offices,
 Chestnut and 56th Sts., Philadelphia, Pa.

C. A. MUSSelman, President
 FRITZ J. FRANK, Executive Vice-President
 FREDERIC C. STEVENS, Vice-President
 JOSEPH S. HILDRETH, ..
 GEORGE H. GRIFFITHS, ..
 EVERIT B. TERHUNE, ..
 ERNEST C. HASTINGS, ..
 WILLIAM A. BARBER, Treasurer
 JOHN BLAIR MOFFETT, Secretary





Follow-through in carbon-bar production



IN the manufacture of Bethlehem Carbon Bars a staff of metallurgical observers, whose responsibility it is to see that the bars possess the qualities the customer requires, follow the steel through melting, pouring, soaking, rolling. They are the agents through whom the division metallurgist enforces the steel-making practice that he has decided upon as a result of careful study of the customer's requirements—the processing the bars will receive, the service for which they are intended.

These observers link together the various stages of production. They provide the follow-through so essential to the production of any quality steel product. They coordinate the entire process of manufacturing Bethlehem Carbon Bars, directing every detail toward the single goal of customer satisfaction.



BETHLEHEM STEEL COMPANY

GENERAL OFFICES: BETHLEHEM, PA.

... THE IRON AGE ...

DECEMBER 19, 1935

ESTABLISHED 1855

Vol. 136, No. 25

Whose Overcoat Are You Paying For?

IN the so-called good old days before the depression, expense accounts concealed many an overcoat. What is meant by this is that some salesmen—a small minority of course—abused their employers' confidence by finagling their expense accounts and got away with it.

There are not many overcoats in today's business expense accounts. The average employer has hard going to keep his head above water and to make up for depression losses and he has to watch every penny as carefully as he used to watch dollars.

Right here you may be inclined to say, "If I were an employer, I would be too smart to let anyone working for me get away with anything like that."

Oh, yes? Well, friend, let me tell you that if you have anything to do with earning a pay envelope or spending the contents of it, you are an employer. For in that case, you are one of the employers of Uncle Sam and as such are supposed to be a director in the largest business concern in the world, measured both by income and outgo.

And, believe it or not, you are unknowingly paying for enough concealed overcoats in your employee's expense accounts to stock all of the clothing stores in the world twice over.

Proof? There is plenty of it. Next time that you buy a package of 15-cent cigarettes, examine the revenue stamp. Does it come right out and say "this is a bill to you from Uncle Sam for Government expenses and the amount is six cents, or a 40 per cent sales tax?" Oh, no, the overcoat is camouflaged by the inscription U.S. I-R, A-20. What you don't know may not bother you!

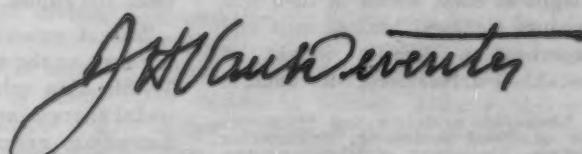
The same thing is true of nearly everything that you buy today. Meats, cotton, potatoes and hundreds of other necessities come to you with concealed Government expense accounts in the price tags. Less than 30 per cent of the Government's tax income comes from income taxes. Seventy per cent or more of Uncle Sam's revenue comes from hidden sales taxes paid by the consumers.

Our representatives in Washington are solicitous that private business shall "put nothing over" on the American consumers. They insist that all packages shall be plainly labeled as to contents so that the buyer shall know what he is paying for. Even Mr. Heinz has to tell you how much benzoate of soda he puts into each bottle of catsup.

Shouldn't we insist that Uncle Sam shall be equally frank with us as to the expense bill that he now writes in invisible ink on nearly every package of food or merchandise?

It will not be done unless you insist upon it. For the army of political hangers-on whose overcoats you are now buying know well that if you knew how much you were paying for them there would be an immediate and indignant insistence upon economy. You would see to it that the political army was whittled down until at least Washington could hold it without annexing Baltimore!

Because of the many requests for reprints of editorials appearing in THE IRON AGE, the publishers have arranged to make such reprints available in any quantity desired at a price representing cost of production and mailing. Please address Reader Service Department, THE IRON AGE, 239 West 39th St., New York City.



The Control of Cupola

BETTER melting practice in the foundry depends on more complete control of the cupola. In pointing the way to better control, the authors carefully analyze the different divisions of cupola practice.

The reactions that occur in each of the four zones in the cupola are explained.

The conditions resulting from the combustion of carbon are arranged in 11 groups based on the proportions of carbon dioxide and carbon monoxide in the gases. The air required to burn 1 lb. of coke under each combustion condition is set forth.

The weight of iron melted and superheated to each of three temperatures with 1 lb. of coke is given.

The original and operating heights of the coke bed for different air pressures are presented.

The method of finding the weight of coke in each charge is explained and the weights of coke charges for cupolas of different sizes are given.

The weights of metal charges for cupolas of different sizes are shown.

The amount of flux to be used in cupola melting is derived.

It is shown that the power required to deliver air to the cupola and the amount of coke consumed vary with the speed of melting.

It is demonstrated that it is unnecessary to decrease the size of the tuyeres or to bosh the cupola above the tuyeres to obtain penetration of the air to the center of the cupola.

• • •



THE cupola furnace is the most widely used melting unit for cast iron, and the best results from its operation can be obtained only when all divisions of the practice are under definite control.

In the following discussion, attention is given to the combustion conditions within the cupola and to the proportioning of the metal, fuel, flux and air supply. A definite amount of air may be supplied to the cupola, containing sufficient oxygen to burn a definite weight of coke, which in turn will produce sufficient heat to melt and superheat a definite weight of metal. Furthermore, a definite

weight of flux is necessary to obtain satisfactory slagging conditions. When the correct proportions of air, fuel, flux, and metal are used, reliable and uniform melting conditions are obtained in the cupola.

The entire shaft of the cupola may be divided into four sections for convenience in examining the operation of this furnace. The upper part of the cupola from the sill of the charging door to the top of the shell is known as the stack. This section serves only for the removal of waste heat and gases from the cupola.

Zone A extends from the charging door to the top of the coke bed. Within this volume, the coke and metal charges are preheated by the ascending gases. On account of the deficiency of oxygen in the

gases in zone A, practically no combustion of the coke takes place in this section. The heat in this region is sufficient to dissociate the limestone flux into lime and carbon dioxide, and to melt some thin pieces of scrap metals. Near the bottom of zone A the temperature of the gases is about 3000 deg. F., and the temperature decreases as the gases travel up through the charges. At the level just below the charging door, temperatures of 800 to 1500 deg. F. have been obtained.

The bottom of the tuyeres locates the lower level of zone B, as shown in Fig. 1. Maximum combustion of the fuel takes place within this section. Furthermore, the charges are so arranged that most of the melting and superheating of the metal occurs in the upper part of zone B.

The lower portion of the interior of the cupola from the bottom of the tuyeres to the sand bottom is the crucible. Molten metal and slag collect between the pieces of coke within this volume. Since practically no combustion takes place below the tuyeres, it is impossible to add heat to the metal which is retained in the crucible.

Combustion Conditions in the Cupola

When the cupola is in operation, air is delivered at a relatively low pressure into a bed of hot coke in the lower part of the cupola. Additional fuel is supplied in the coke charges to preheat, melt and superheat the succeeding metal charges. Combustion is maintained by the chemical reactions which take place when carbon and oxygen are brought together at relatively high temperatures.

The conditions for supporting combustion are not ideal because the materials used for this pur-

*Associate professor and **Instructor of metal processing, Engineering College, University of Michigan, Ann Arbor, Mich.

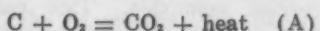
Operation

By H. L. CAMPBELL* and
JOHN GRENNAN**

pose are not in the pure, elementary form. Foundry coke usually contains over 5 per cent by weight of ash which must be removed after the coke has burned, and the nitrogen content of the air is about 76.9 per cent by weight. The intensity of the heat developed by the oxidation of the carbon in the coke is decreased by the nitrogen in the air supply.

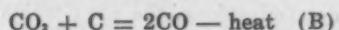
However, the heat efficiency of the cupola is high compared with other melting furnaces because the products from the combustion of the fuel come in direct contact with the materials being melted, and the counter flow of gases and melting stock permits the recovery of much of the heat produced within the cupola.

At the high temperatures encountered in the bed of a cupola furnace, the oxygen in the air supply combines with the carbon in the coke to form carbon dioxide. The chemical reaction for the complete combustion of carbon is as follows:



This equation implies that 12 lb. of carbon will combine with 32 lb. of oxygen to produce only carbon dioxide with an evolution of heat. The complete combustion of 1 lb. of carbon requires 2.66 lb. of oxygen, and develops 14,550 B.t.u. of heat.

Another chemical reaction which occurs to some extent in normal cupola operation is indicated by the following equation:



This secondary reaction takes place when the carbon dioxide formed by complete combustion comes in contact with more carbon at high temperatures. For every pound of carbon consumed in this way, 5850 B.t.u. of heat are absorbed from the reacting materials. Hence, the

conditions which favor this reaction are avoided as much as possible in cupola practice.

When the cupola blower is operating, the air which enters the tuyeres encounters the hot coke in the bed and soon becomes heated. Combustion of the coke proceeds more rapidly as the air passes up through the coke in the bed. If the bed is of sufficient height, a location is reached at which the oxygen in the air is completely consumed by combustion to carbon dioxide according to reaction (A). As the carbon dioxide thus formed continues to travel past more hot coke, some carbon monoxide is produced according to reaction (B). If the height of the coke bed and the rate of the air supply are properly adjusted, this heat-consuming reaction proceeds only to a minimum extent.

In Table I, the conditions resulting from the combustion of carbon are arranged in 11 groups based on the proportions of carbon dioxide (CO_2) and carbon monoxide (CO) finally produced from the combustion reactions. The analyses of the gases associated with the different combustion conditions as given in Table I were found by transposing the weights of the products to proportions by volume. With condition A, all the carbon is burned to carbon dioxide, and, according to the reaction for complete combustion, 2.66 lb. of oxygen are required to burn 1 lb. of carbon. This weight of oxygen (O_2) is equivalent to 11.5 lb. of air or 151 cu. ft. of air at 60 deg. F. and 14.7 lb. per square inch. If the coke contains 90 per cent carbon, 136 cu. ft. of air will be necessary to burn 1 lb. of coke. With condition K, all the carbon is finally burned to carbon monoxide and one-half as much air is needed as is required for combustion condi-

tion A. With condition F, equal amounts of carbon are finally burned to carbon dioxide and carbon monoxide, and the reactions require $2.00 \text{ lb. of oxygen } [(2.66 \times .50) + (1.33 \times .50)]$; this is equivalent to 102 cu. ft. of air for every pound of coke containing 90 per cent carbon.

The combustion condition within any cupola can be established by the analysis of the cupola gases. With good cupola practice, the proportions by volume of carbon dioxide and carbon monoxide in the gases just below the charging door will be about equal. The gas samples from cupolas operating under favorable conditions will contain about 14 per cent carbon dioxide, 12 per cent carbon monoxide, and 74 per cent nitrogen. The carbon monoxide content of cupola gases is seldom greater than 20 per cent by volume. On the other hand, the analyses of cupola gases seldom show less than 7 per cent by volume of carbon monoxide, unless auxiliary air is introduced above the coke bed.

Melting Ratio

The total heat produced from the complete combustion of 1 lb. of carbon is 14,550 B.t.u., or of 1 lb. of coke containing 90 per cent carbon is 13,095 B.t.u. $(14,550 \times 0.90)$. If the conditions are such that only carbon monoxide is produced from the combustion reactions, the total heat developed from each pound of coke will be 3915 B.t.u. $[(14,550 - 5850) \div 2 \times 0.90]$. The amounts of heat produced from 1 lb. of coke for other combustion conditions are given in Table II. Under combustion condition F, 75 per cent of each pound of carbon is burned initially to carbon dioxide with the development of 10,912.5 B.t.u. of heat $(14,550 \times 0.75)$, and the remain-

TABLE I
AIR REQUIRED FOR DIFFERENT COMBUSTION CONDITIONS

Combustion Condition	Per Cent Weight of Carbon Burned			Gas Analysis, Per Cent Volume of Gases			Lb. O ₂ per Lb. Coke	Lb. Air per Lb. Coke	Cu. Ft. Air per Lb. Coke	Cu. Ft. Air per Lb. Coke (90 Per Cent C.)				
	Initally	Finally		CO ₂	CO	N ₂								
		CO ₂	CO											
A	100	100	0	21.0	0	79.0	2.66	11.5	151	136				
B	95	90	10	19.7	2.1	78.3	2.53	10.9	143	129				
C	90	80	20	18.3	4.5	77.2	2.39	10.4	136	123				
D	85	70	30	16.6	7.1	76.3	2.26	9.8	128	115				
E	80	60	40	15.0	9.9	75.1	2.13	9.2	121	109				
F	75	50	50	13.0	13.0	74.0	2.00	8.7	113	102				
G	70	40	60	10.9	16.6	72.5	1.86	8.1	106	95				
H	65	30	70	8.7	20.3	71.0	1.73	7.5	98	88				
I	60	20	80	6.1	24.6	69.3	1.60	6.9	91	82				
J	55	10	90	3.2	29.4	67.4	1.46	6.3	83	75				
K	50	0	100	0	34.7	65.3	1.33	5.8	76	68				

ing 25 per cent reacts with the carbon dioxide gas to produce carbon monoxide with 1,462.5 B.t.u. of heat (5850×0.25) absorbed as a result of this reaction. Therefore, the net amount of heat available from 1 lb. of carbon when burned under combustion condition F is 9450 B.t.u. ($10,912.5 - 1,462.5$) and from 1 lb. of coke is 8505 B.t.u. (9450×0.90).

The amount of heat required to melt 1 lb. of cast iron and to superheat this metal to any desired pouring temperature is given in Fig. 2. When the iron is tapped from the cupola at 2550 degrees F., 460 B.t.u. of heat will be necessary for each pound of metal.

To determine the number of

¹ J. E. Hurst, "Melting Iron in the Cupola," Penton Publishing Co., 1929. Refer to pages 111-118.

² A. W. Belden, "Foundry-Cupola Gases and Temperatures," United States Bureau of Mines Bulletin 54, 1913.

pounds of cast iron which can be melted with one pound of coke in the cupola, it is necessary to establish the proportion of the total heat which is used for preheating, melting and superheating the metal. Other uses of heat in the cupola include heating the gases and the coke in addition to the preheating and dissociation of the limestone.

Attempts have been made to determine the heat balance for the cupola furnace, and the results have shown that about 50 per cent of the actual heat produced from the combustion of the coke is used in heating and melting the metal charges.⁽¹⁾ As 8505 B.t.u. are produced from 1 lb. of coke under combustion condition F, 9 lb. of metal can be melted and superheated to 2550 deg. F. with 50 per cent of the total heat produced from the coke [$(8505 \times 0.50) \div 460$].

When a greater heat efficiency

is obtained or a larger amount of heat is produced as a result of more favorable combustion conditions, the ratio of pounds of metal melted per pound of coke will be increased. The heat produced from 1 lb. of coke and the number of pounds of metal which can be melted and superheated to each of three different temperatures under the specified combustion conditions are given in Table II.

When steel scrap is used in the metal charges for the cupola, some carbon is absorbed by the steel, and the number of pounds of metal melted for each pound of coke will necessarily be less than is possible when only pig iron and iron scrap are used in the cupola charges.

The Height of the Coke Bed

The coke bed is made sufficiently high so that all melting of the metal charges will be confined to that portion of the cupola in which there is no free oxygen. The production of iron of good quality by this method of melting depends to a large extent upon maintaining the correct height of the coke bed throughout the entire heat.

When the bed is too low, the oxygen in the air supply will not be completely consumed by the coke in the bed, and will pass up through the metal charges, causing the rapid oxidation of the metal.

If the coke bed is higher than is necessary for the complete consumption of the oxygen, the carbon dioxide formed initially will combine with more carbon in the upper part of the bed to produce carbon monoxide. This reaction will prevent the development of the maximum amount of heat from the coke in the top portion of the bed and will retard the melting.

An extensive investigation of conditions of combustion within a cupola furnace was made in 1913 by A. W. Belden of the United States Bureau of Mines.⁽²⁾ The compositions and temperatures of the gases were found at many points within the coke bed of a cupola. From the results of these determinations, the area which located the highest temperatures in the fuel bed was found to have the shape of an inverted cone with the base intersecting the cupola lining 20 in. above the top of the tuyeres, when the air was supplied at a pressure of 5.3 oz. per square inch. The line A-B-C in Fig. 1 locates the cross-section of the area of

TABLE II
METAL TO COKE RATIOS FOR DIFFERENT COMBUSTION CONDITIONS

Combustion Condition	Heat Produced per Lb. of Coke (90 Per Cent C.)	Lb. Iron Melted Per Lb. of Coke and Superheated to		
		2250 Deg. F.	2650 Deg. F.	2750 Deg. F.
A	13,095	14	14	13
B	12,087	13	12	12
C	11,259	12	12	11
D	10,341	11	11	10
E	9,423	10	10	9
F	8,505	9	9	8
G	7,587	8	8	7
H	6,669	7	7	7
I	5,751	6	6	6
J	4,833	5	5	5
K	3,915	4	4	4

highest temperature in the coke bed. Below this area free oxygen is present in the gases. In order to melt the metal charges without excessive oxidation, all melting must be completed above the level in which oxygen is present in the fuel bed of the cupola. The exact location of this area, which is represented by the straight line *A-C* in Fig. 1, is dependent upon the velocity of the gases or indirectly on the volume of the air supplied to the cupola.

The investigations that have been made of the conditions of combustion within the fuel bed of the cupola furnace have shown that the oxygen in the air supply is gradually consumed as it passes through the hot coke bed. A certain amount of time is required for the oxygen to combine with the carbon, and the distance that the oxygen travels before it is completely burned to carbon dioxide depends upon the velocity of the gases. This, in turn, is controlled by the volume of air delivered to the cupola. An increase in the volume of the air supply causes an increase in the pressure in the wind belt, with other conditions constant. Since the air pressure can be readily measured, the location of the region of minimum oxygen in the coke bed can be established most conveniently on this basis.

The line *A-C* in Fig. 3 indicates the minimum operating heights of the coke bed for all pressures in a cupola of any size. The points on the line *A-C* were computed on the basis of the increase in the velocity of the gases over that used by Belden to obtain a height of 20 in. above the top of the tuyeres for the location of minimum oxygen.

It is important that all melting of the metal charges be confined above the line *A-C* in Fig. 3, where practically no oxygen is present in the gases. The line *D-E* locates the top of the 6-in. layer of coke which will replace the coke consumed in the development of heat for melting and superheating the first metal charge. To compensate for the settling of the bed, as well as for the consumption of fuel from the time the coke bed is measured until the blower is started, the bed is increased by an additional height of 10 in.; this is known as safety coke. Under normal operating conditions, the height of the coke bed varies between

points on the line *D-E* and points on the line *A-C* corresponding with the operating air pressure in the wind belt. The coke between these limits is replaced intermittently by the succeeding coke charges.

The Coke Charge

The coke in the bed which is consumed to furnish the heat for melting the metal charges is re-

facture, as well as the care taken in handling this fuel. If the relation of weight to volume for a specific coke cannot be found by trial, it may be assumed that, as an average, 1 lb. of foundry coke occupies 65 cu. in. The weights of the coke charges given in Table III for cupolas of different sizes were calculated on this basis. The coke charges are placed as level as

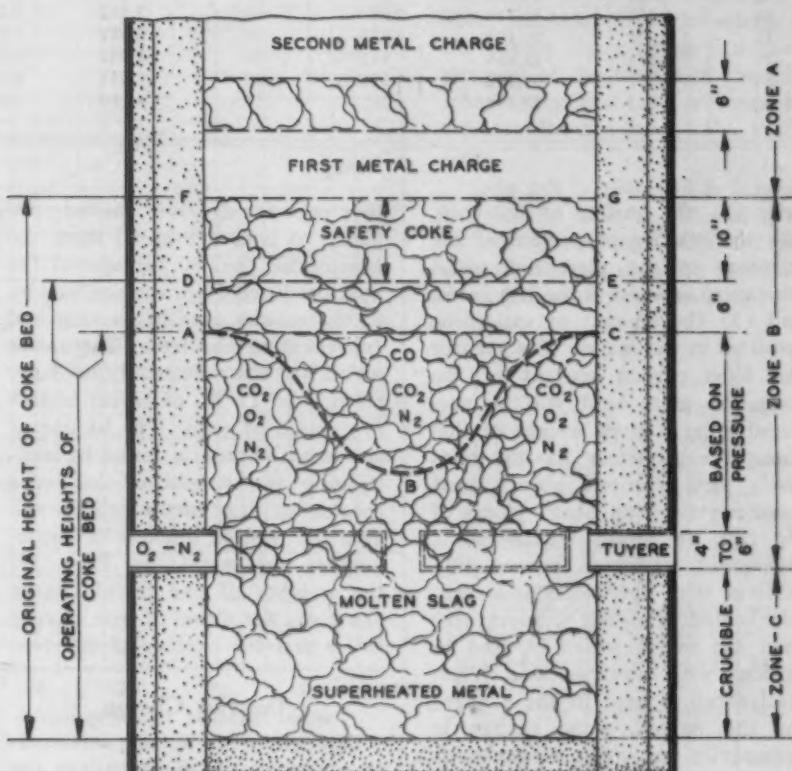


FIG. 1—Cross-section of cupola.

plenished by the intermediate coke charges. In this way, the coke bed is maintained at the correct level to insure favorable melting conditions. To decrease the formation of carbon monoxide, which lowers the temperature of the gases, the coke charges are kept as small as practical. With the ordinary sizes of foundry coke, layers less than 6 in. in thickness are not readily obtained. Therefore, each coke charge will contain a definite weight of dry coke which can be placed in a height of 6 in. within the cupola. This amount of coke can be determined experimentally by weighing the coke which will fill a cylinder having the same diameter as the cupola and a height of 18 in., and dividing by three. The volume occupied by 1 lb. of foundry coke varies with the method of manu-

possible over the entire area of the cupola so that the top of the coke bed will remain level during the entire melting period.

When large pieces of iron scrap or large bundles of steel scrap are included in the metal charges, it is desirable to have the coke charges of sufficient thickness so that combustion will be maintained for the length of time required for all the metal in each charge to be melted before it reaches the region containing free oxygen.

The Metal Charge

The heat from the combustion of the coke preheats, melts, and superheats the pig iron and scrap metals in the charges. The ratio of the weight of metal melted for each pound of coke is dependent upon a number of conditions, among which

TABLE III
WEIGHTS OF MATERIALS IN CUPOLA CHARGES

Dia. Inside Lining, In.	Area Inside Lining, Sq. In.	Volume 6 In. High, Cu. In.	Coke per Charge, Lb.	Limestone per Charge, Lb.	Weight of One Metal Charge				
					Ratio 7 to 1, Lb.	Ratio 8 to 1, Lb.	Ratio 9 to 1, Lb.	Ratio 10 to 1, Lb.	Ratio 11 to 1, Lb.
32	804	4,824	74	15	518	592	666	740	814
36	1,018	6,108	94	19	648	752	846	940	1,034
42	1,385	8,310	128	26	896	1,024	1,152	1,280	1,408
48	1,810	10,860	167	33	1,169	1,336	1,503	1,670	1,837
54	2,290	13,740	211	42	1,477	1,688	1,899	2,110	2,321
60	2,827	16,962	261	52	1,827	2,088	2,349	2,610	2,871
66	3,421	20,526	316	63	2,212	2,528	2,844	3,160	3,476
72	4,072	24,432	376	75	2,632	3,008	3,384	3,760	4,136
78	4,778	28,668	441	88	3,087	3,528	3,969	4,410	4,851
84	5,542	33,252	512	102	3,584	4,096	4,608	5,120	5,632
90	6,362	38,172	587	117	4,109	4,696	5,283	5,870	6,457

are: (1) the quality of the coke, (2) the relative proportion of the surfaces of the pieces of metal which are exposed to the hot gases, and (3) the amount of superheat required in the metal. The greater the fixed carbon content of the coke, the more heat will be produced from a given weight of this fuel. Scrap metals having relatively thin sections absorb heat more rapidly than heavy pieces of pig iron or scrap. Furthermore, the metal which is poured into castings with light sections is usually heated to higher temperatures than the metal which is used in castings with heavy sections. When steel scrap is used in the charges for the cupola, some carbon is necessarily consumed in carburizing this material. Therefore, the ratio of the weights of metal to coke must be established on the basis of all the operating conditions.

The values given in Table II for

the pounds of iron melted per pound of coke are based upon the assumption that 50 per cent of the heat produced from the combustion of the coke is used in melting and superheating the iron. The ratios which are most commonly used are from 7 to 11 lb. of metal melted per pound of coke. The weight of one metal charge is found by multiplying the weight of one coke charge by the factor which will give the desired amount of superheat in the metal. In Table III the weights of one metal charge are given for different iron to coke ratios and for cupolas of different sizes.

The Flux Charge

The non-metallic, non-combustible materials which accompany the cupola charges or are produced during melting form a viscous slag within the cupola. If this slag is allowed to accumulate in sufficient quantity, it will interfere with good melting practice. The combustion

of the fuel and the melting of the metal are retarded by the presence of a gummy slag which adheres to the surfaces of the pieces of the stock. Furthermore, slags which fuse at high temperatures obstruct some of the gas passages through the charges, and this condition will make uniform melting impossible. The viscosity of cupola slags is lowered by the addition of fluxes to the charges. Limestone (CaCO_3) is the most important cupola flux, although fluorspar (CaF_2) and soda ash (Na_2CO_3) are also used for this purpose.

The most satisfactory fluxing material is calcium oxide (CaO), which is produced by the decomposition of limestone within the cupola. The calcium oxide combines with silicon oxide (SiO_2) to form a calcium silicate slag.



This reaction requires 1.66 lb. of pure limestone, or 1.71 lb. of limestone containing 3 per cent of im-

TABLE IV
AIR SUPPLY AND MELTING RATE

Dia. Inside Lining In.	Coke per Charge	Cu. Ft. Air 6 In. One Coke Total	Cubic Feet of Air per Minute			Melting Rate: Tons per Hour		
			To Burn One Coke	To Burn One Coke	To Burn One Coke	9 Lb. of Metal Melted per Lb. of Coke	8 Lb. of Metal Melted per Lb. of Coke	
			in 4 Min.	in 5 Min.	in 6 Min.	4 Min.	5 Min.	6 Min.
32	74	7,548	1,887	1,509	1,258	5.0	4.0	3.3
36	94	9,588	2,397	1,917	1,598	6.3	5.1	4.2
42	128	13,056	3,264	2,611	2,176	8.6	6.9	5.8
48	167	17,034	4,259	3,407	2,839	11.3	9.0	7.5
54	211	21,522	5,381	4,304	3,587	14.2	11.4	9.5
60	261	26,622	6,656	5,324	4,437	17.6	14.1	11.7
66	316	32,232	8,058	6,446	5,372	21.3	17.1	14.2
72	376	38,352	9,588	7,670	6,392	25.4	20.3	16.9
78	441	44,982	11,246	8,996	7,497	29.8	23.8	19.9
84	512	52,224	13,056	10,445	8,704	34.6	27.6	23.0
90	587	59,874	14,969	11,975	9,979	39.6	31.7	26.4

purities to unite with each pound of silicon oxide.

The silicon oxide content of the cupola charges is derived mainly from the ash of the coke, from the products of oxidation of the metal, and from the sand on the iron scrap. If it is assumed that the coke contains 10 per cent ash, and that 250 lb. of coke are required

two sources alone amounts to 37.4 lb. This is equivalent to about 15 per cent of the weight of the coke used. Other sources of slag are the cupola patching material and the sand on the metals which are charged into the furnace.

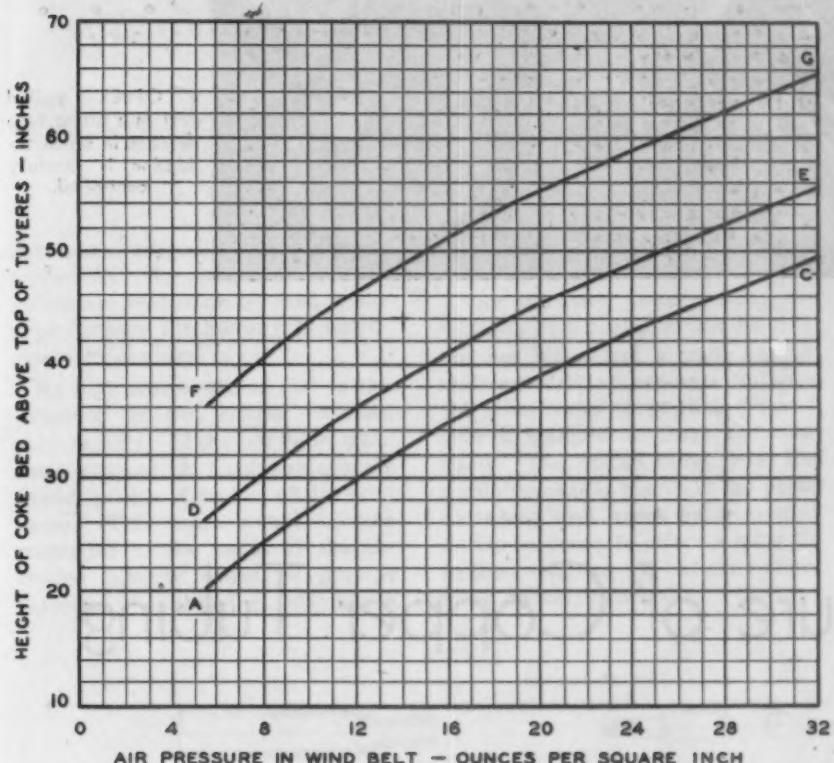
The limestone is apportioned according to the conditions of operation for every cupola; as a rule,

20 per cent of the weight of the coke consumed in melting is a satisfactory proportion for the limestone additions. The limestone flux is distributed uniformly over each coke charge and is kept away from the lining. Since the coke can usually be placed more level in the cupola than the metal charges, the limestone can be distributed more uniformly over the coke layers.

Fluorspar is a very active fluxing agent for cupola slags and is often supplied with limestone in the cupola charges; as little as 5 per cent of the weight of the limestone is sufficient to increase noticeably the fluidity of the cupola slag.

Soda ash is also used to increase the fluidity and the dissolving action of cupola slags. Under favorable conditions, soda ash is a valuable

(CONTINUED ON PAGE 84)



to melt 2000 lb. of metal, 25 lb. of ash will be produced in the cupola during the melting of every ton of metal. Since the ash contains approximately 50 per cent of its weight of silicon oxide, the combustion of 250 lb. of coke will produce 12.5 lb. of silicon oxide.

During the melting of the metal mixtures in the cupola, silicon is oxidized to the extent of about 10 per cent of the total silicon in the metal charges. The silicon oxide from this source collects in the cupola slag. If it is assumed that the total metal mixture contains 2.20 per cent silicon, the normal oxidation of 2000 lb. of metal will result in the formation of 9.4 lb. of silicon oxide. When this amount is added to the weight of silicon oxide from the coke used in melting the metal, a total of 21.9 lb. will be obtained. The weight of limestone which will be required to produce a liquid slag by combining with the silicon oxide from these

FIG. 3—Heights of coke bed for different air pressures.

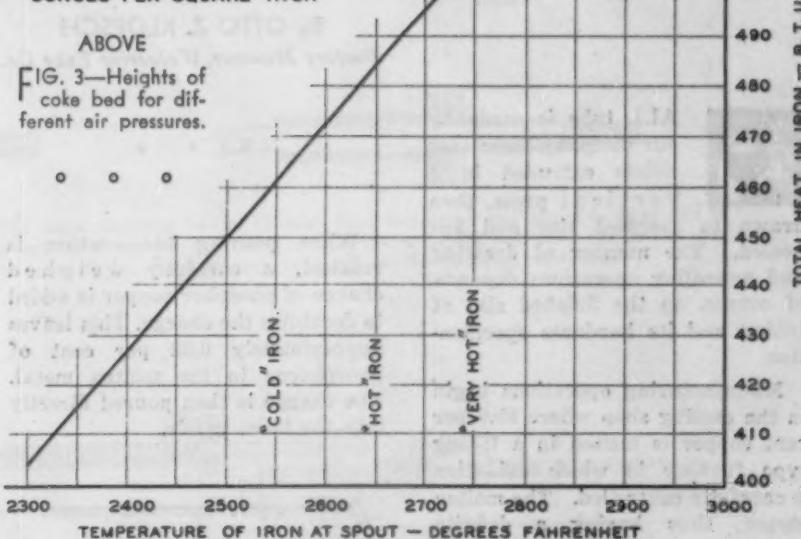


FIG. 2—Total heat in iron at cupola spout.

Basis of Diagram

Original temperature of iron=60 deg. F.
Iron melts at 2250 deg. F.

Specific heat of solid iron (60 to 2250 deg. F.)=0.16 B.t.u. per lb. per deg. F.

Latent heat of fusion=41.5 B.t.u. per lb.

Specific heat of liquid=0.23 B.t.u. per lb. per degree F.



COPPER is melted in a tilting type furnace in which oxidation is carefully controlled.

Manufacture of Copper Tubing

By OTTO Z. KLOPSCH
Factory Manager, Wolverine Tube Co.



ALL tube is made by our company from cast billets extruded in a vertical press, then drawn to specified size and annealed. The number of drawing and annealing operations depends, of course, on the finished size of tubing and its hardness specification.

Manufacturing operations begin in the casting shop where 99.9 per cent copper is melted in a tilting type furnace in which oxidation is carefully controlled. The molten copper, thus having a definite oxygen content, is held in the furnace under a blanket of charcoal briquettes until it is brought up to pouring temperature. The charcoal blanket is used to prevent further oxygen absorption.

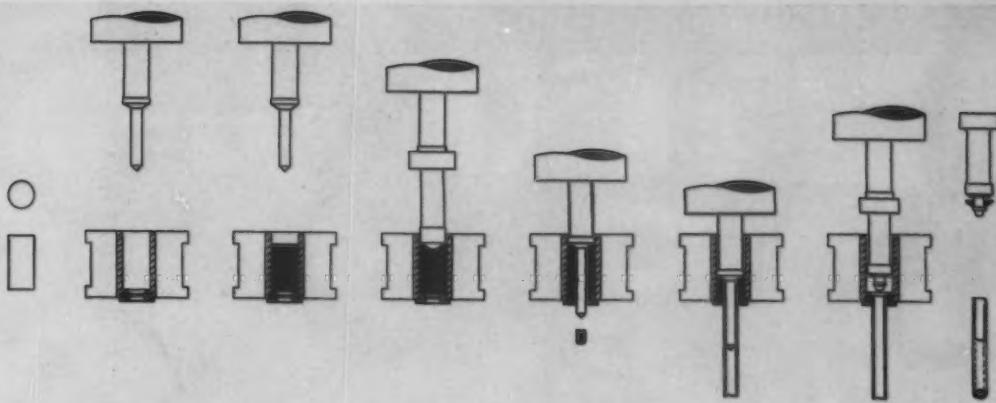
This paper was presented by the author before the non-ferrous section of the Detroit chapter of the American Society for Metals, on Nov. 11, 1935.

When pouring temperature is reached, a carefully weighed charge of phosphor copper is added to deoxidize the charge. This leaves approximately 0.02 per cent of phosphorus in the molten metal. The charge is then poured directly into the billet molds.

THE author describes the methods used by his company in producing copper tubing for use in the air conditioning, automotive, oil burner, plumbing and refrigeration industries.

All billet molds are water cooled and are coated on the inside with a suitable mold dressing. Water is allowed to drip into the mold being poured at the rate of approximately 100 c.c. per minute. The water tends to draw the carbonized mold dressing to the center and top of the rising column of molten metal, as well as to form a steam blanket over it which keeps oxidation to a minimum, with the result that a clean non-porous billet is produced. Incidentally, unless phosphorus is maintained in the molten metal, the addition of water will result in an explosion.

Immediately after casting, the billet is shrunk back by ladle addition of molten copper. Then it is allowed to cool. Upon removal from the mold, the billet is quenched to handling temperature and sent to the power saw where it is cut into specific lengths for



SEQUENCE of operations in extrusion press, consisting mainly of a container for holding the hot billet and ram having sufficient driving pressure to force the billet metal through a die and over a mandrel to form the tube itself.

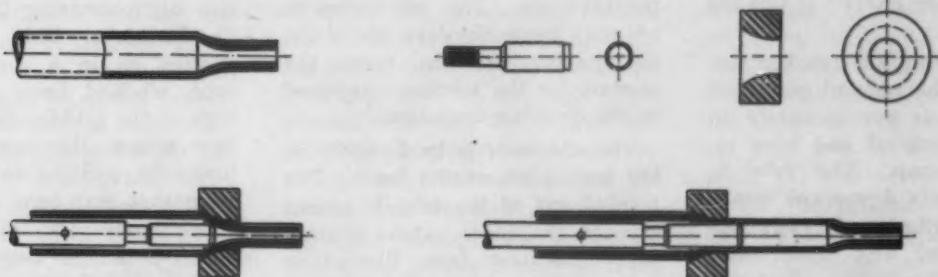
extrusion. (Fig. 2.) After careful inspection, the extrusion length billets are sent to an oil-fired muffle type furnace for heating to extrusion temperature.

At high temperatures and in the presence of air, copper oxidizes very rapidly. If the hot billet were thus exposed, a hard oxide scale would quickly form on all its surfaces. This scale would become embedded in the metal of the extruded tube to cause its prompt rejection. A reducing atmosphere

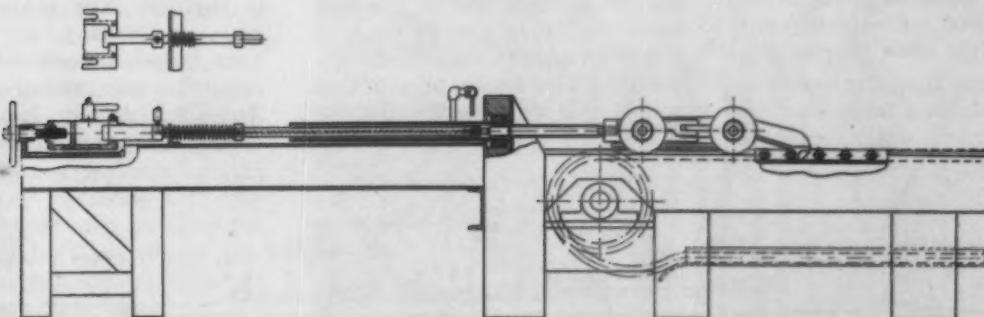
is therefore held in the muffle furnace.

The extrusion press consists essentially of a container for holding the hot billet and a ram having sufficient driving pressure to force the billet metal through a die and over a mandrel to form the tube itself. The heated billet from the muffle furnace is placed in the press container and upset by a special device in order to effect a snug fit in the container. At the same time, it is center punched.

The work end of the ram carries a head with piercing mandrel extending below it. This mandrel punches a hole longitudinally through the axis of the billet. The mandrel is just long enough to protrude slightly through the die at the bottom of the container when the head makes contact with the top of the billet. During the remaining portion of the downward stroke, the head forces the billet metal through the die and around the lower end of the piercing



TO start the draw, one end of the large diameter hollow cylinder tube is pointed and opposite open end is placed over a hollow rod which carries the draw pin. This rod serves to locate the draw pin in the die opening and forms the conduit for the lubricant required in the drawing operation.



DIE is held rigidly in head block of bench. Pointed end of tube is passed through die to extend slightly beyond its inner face, where it is gripped by a tong. Hook of tong drops into link of continuous chain which carries it forward along bench until entire tube has passed through die. As rear end of tube clears die, tension on tong is relieved and it automatically disengages. Drawn tube then is pushed over into rack at side of bench and tong returns to die by means of cable and friction clutch. Cycle then is repeated.



After two or three passes through dies, tube is annealed in continuous belt-type oil-fired open furnace, one high on the griddle.

mandrel. Thus a perfect seamless tube of large diameter is formed.

It is apparent that the hot billet metal actually flows under a steady uniform pressure, also that the initial crystalline structure of the original billet is entirely changed by reason of the severity of this hot work.

After the ram has reached bottom stroke, the remaining butt of metal which is approximately $\frac{1}{8}$ in. thick, is cut off and later returned to scrap. The tube as formed projects downward into a longitudinal pit where it is straightened by hand and then water quenched. The quench effectively removes whatever oxide has formed on the surface of the tube during the few seconds it is exposed to the air after extrusion. A conveyor returns the quenched tubes to the plant floor level for inspection and transfer to the draw benches.

As it comes from the extrusion press the tube is a large diameter hollow cylinder which must be

progressively reduced in diameter and wall thickness in a series of drawing operations.

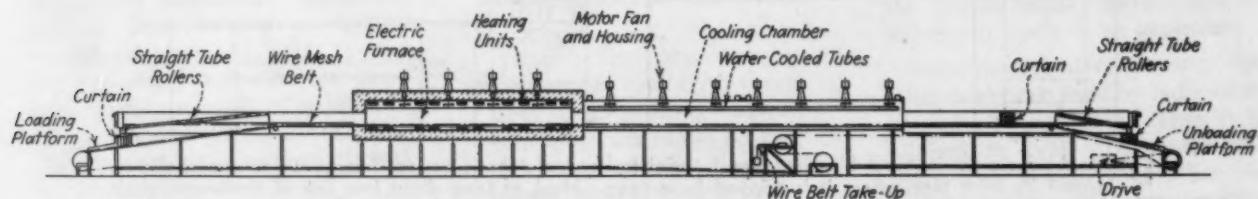
In order to start the drawing, one end of the tube is pointed and the opposite open end is then laced over a hollow rod which carries the draw pin. This rod serves to properly locate the draw pin in the die opening, and also forms the conduit for the lubricant required in the drawing operation.

The die itself is held rigidly in the head block of the bench. The pointed end of the tube is passed through the die to extend slightly beyond its inner face. There it is gripped by a tong. The hook of the tong drops into a link of a continuous chain which carries it forward along the bench until the entire tube has passed through the die. As the rear end of the tube clears the die, tension on the tong is relieved and it automatically disengages. The drawn tube is then pushed over into a rack at the side of the bench and the tong returned

to the die by means of a cable and friction clutch. The cycle is then repeated.

After two or three passes through the dies, a tube must be annealed to refine the grain structure and is annealed to a grain size approximating 0.050 mm. at 75 diameters. This annealing is carried on in a continuous belt type, oil-fired, open furnace, one high on the griddle. Because of the open anneal, this operation is followed by pickling to remove any scale that may have formed. The solution used for this purpose is one having a sulphuric acid content of 10 per cent.

After pickling and pointing, drawing is again resumed until either the tube is reduced to specified dimensions or the next anneal is required. The subsequent anneals, incidentally, are what we term bright anneals which differ from the open anneal first used. Annealing usually follows a reduction of approximately 90 per



STRAIGHT lengths of pipe are self-purged due to the stack effect and excess pressure inside the bright annealing furnace. Diagram illustrates operation of furnace.



COPPER tubing is bright annealed in this gas-fired General Electric furnace. Furnace atmosphere is gas made by burning a mixture of four parts of air with one part of city gas.

cent in metal cross-section. The number of anneals depends, of course, on the ultimate tube size desired.

Tubing is used commercially in both straight lengths and in coils. After leaving the draw benches, therefore, it is necessary to remove the points and tails and cut the tube into specified lengths, all of which is done on a standard band saw. Tubing to be coiled is sent to the coiling machines and the remainder to the straighteners. The coiling machine consists essentially of three or more power-driven grooved rolls, one of which being offset from the horizontal plane causes the tube to take the form a coil. The finished coils are then delivered to the annealing furnace for the final anneal.

Normally, the twelve-roll straightener is used for tubing that is to be delivered in straight lengths. For precision tube parts, straightening is done on the Sutton or Medart machines which are very much alike and which accurately maintain roundness during the straightening operation. If the straight lengths are to meet the specification for hard copper tubing, they go immediately from the straightening machines to the shipping room. Otherwise, they are annealed to obtain the specified temper.

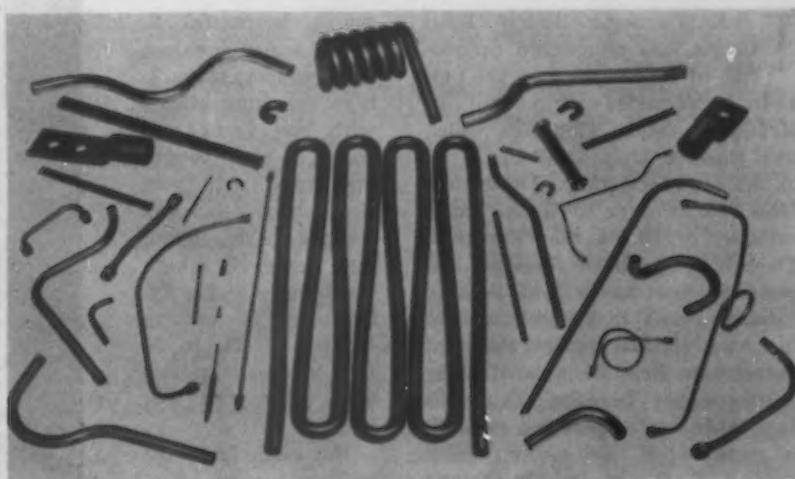
One of the plant's most interesting processes is the bright annealing

ing of copper tubing in a General Electric bright annealing furnace. Obviously, for use as a conductor of refrigerant, gasoline or oil burner fuels, tubing must be completely free of scale. Annealing must be accomplished, therefore, in an atmosphere free from all oxygen. The atmosphere within this furnace is a gas made by burning a mixture of four parts of air with one part of city gas. This process eliminates the oxygen, but it introduces sulphur and moisture which must be removed before the gas is admitted to the furnace.

Sulphur in even small quantities attacks hot copper readily to form

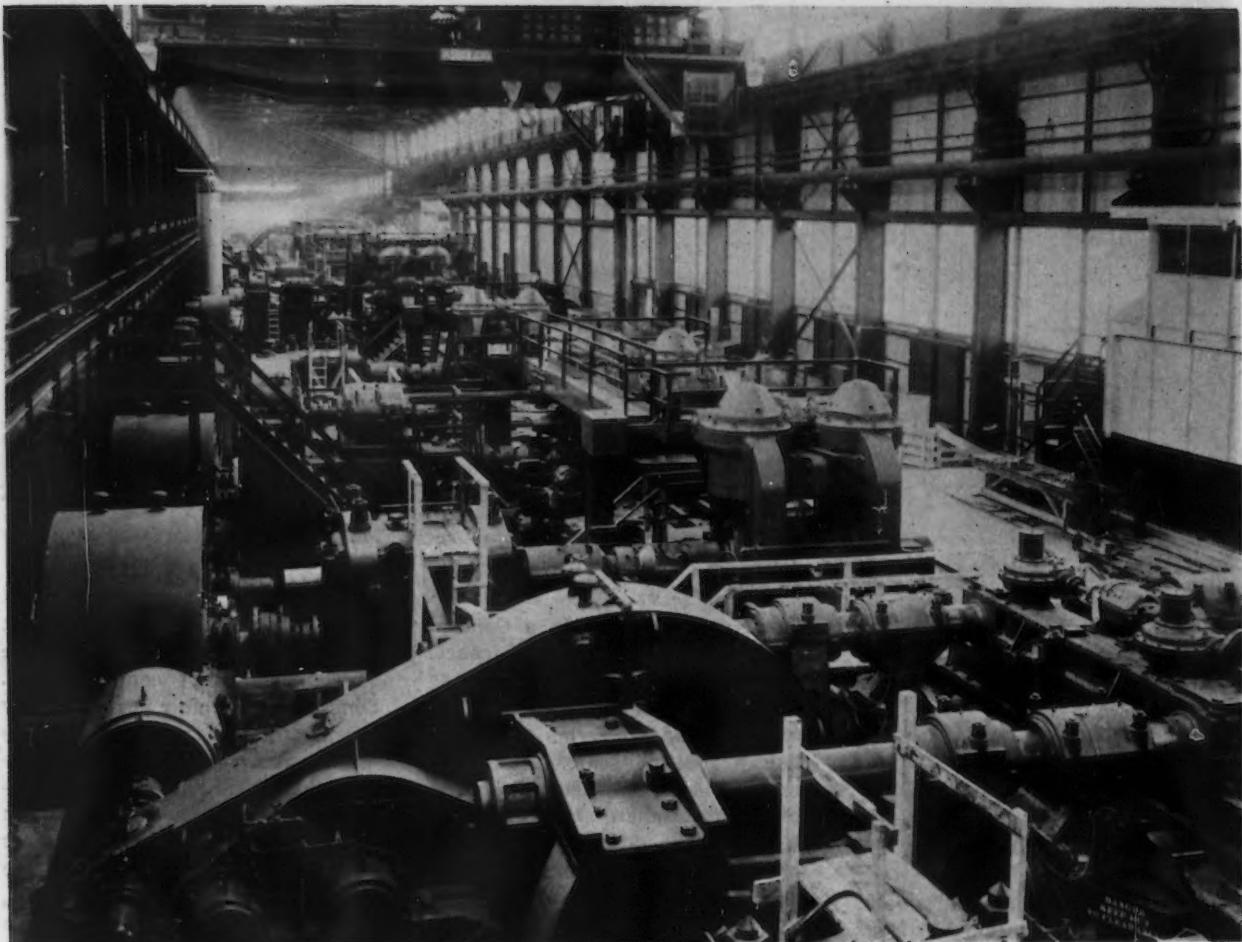
copper sulphide, which is a jet black substance and objectionable on the surface of copper tubing. Some of the sulphur is removed by passing the gas through iron oxide which removes the inorganic sulphur as H_2S . The inorganic sulphur-free gas is then sent through cooling coils to remove the organic sulphur that remains and is in the form of dilute solutions of H_2SO_3 and H_2SO_4 , due to combining with the moisture. The resulting gas is not only free of oxygen and sulphur, but also perfectly dry as it enters the furnace. This special gas is introduced into the furnace

(CONTINUED ON PAGE 86)



SOME of the many uses to which copper tubing is being applied.

... New Carnegie-Illinois

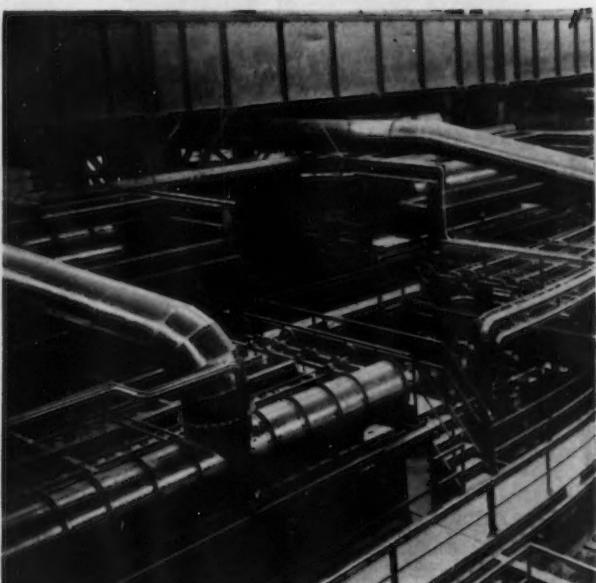


VIEW showing mill proper from No. 1 furnace, squeezer is shown in the foreground.

TH E Carnegie-Illinois Steel Corp. has announced completion of construction on the new 43-in. continuous strip mill at McDonald, Ohio. This mill, which will produce strip steel up to 37 in. wide and ranging in thickness from No. 18 gage to $\frac{3}{8}$ in., has a capacity of 30,000 tons a month. The mill is served by three natural gas-fired, continuous type heating furnaces, each 18 ft. wide and 75 ft. long inside, with sufficient capacity to heat 50 tons of slabs per hour per furnace. All rolls have 43-in. wide face, and the mill is capable of delivering rolled product from the finishing stand at the rate of 2000 ft. per minute. The mill consists of the following

units: horizontal 2-high scale breaker, slab reducer, three 2-high roughing stands with one vertical edger, 4-high roughing stand with vertical edger, delay and rocking table, flying crop shear, six 4-high finishing stands, flying shear for cutting lengths 10 ft. to 30 ft., two coilers and one piler for cut lengths.

Hot coils from the mill are conveyed to a storage area, where they are weighed and

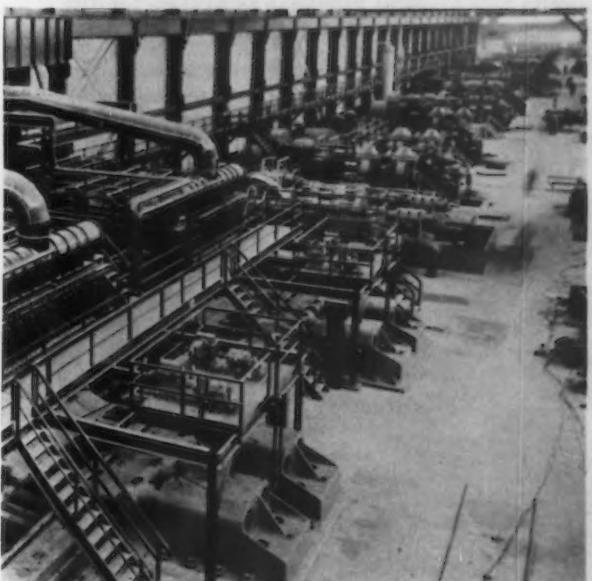


HEATING furnaces 1.

McDonald Strip Mill ▲ ▲ ▲



FINISHING stands from the coiler building.



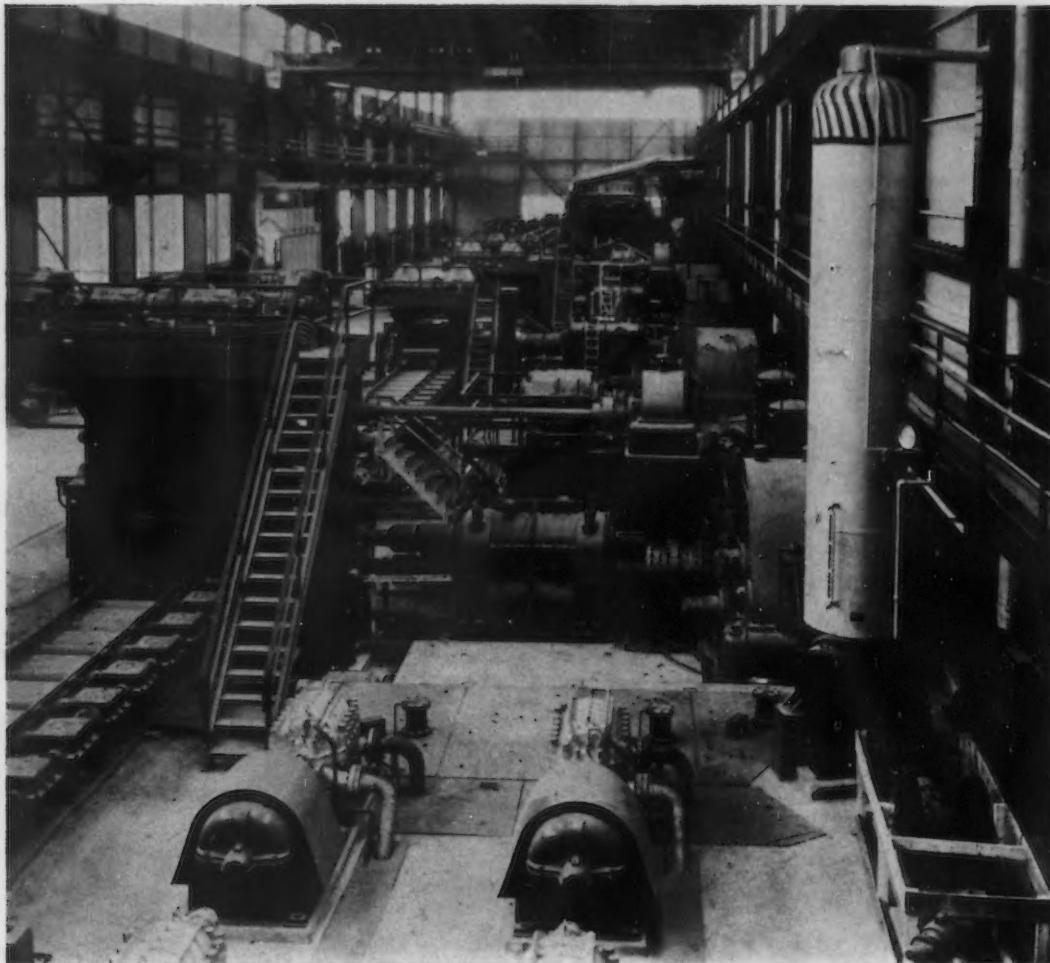
2, and 3 in foreground.

allowed to cool. From there they are either loaded into cars for direct shipment or put on another conveyor serving three coil processing units. These units can process the coils for prevention of "coil break," trim the edges or slit the coils into as many as seven multiples, or shear into accurate cut lengths.

Hot packed material in lengths from 10 to 30 ft. from the mill is weighed and

placed on racks in coiler building for cooling. They are then transferred by either conveyor or electric transfer car to three pack processing units.

Additional auxiliary equipment includes a 4-arm batch pickling unit, a natural gas-fired normalizing furnace, a skin pass mill, a squaring shear, roller levellers and oiling equipment. The mill has 46 Selsyn devices which allow micrometer adjustment of the rolls and guides, and are electrically indicating. They afford silent thickness indication of the product in all parts of the mill. The mill also is equipped with pumping equipment and sprays for use in



AT LEFT

SPRAY pumps
and mill proper
from No. 4
roughing stand
to the heating
furnaces.

BELOW

NO. 2 scale
breaker and
finishing stand.

breaking scale as the steel passes through the mill, water at 1000 lb. pressure being used for this purpose.

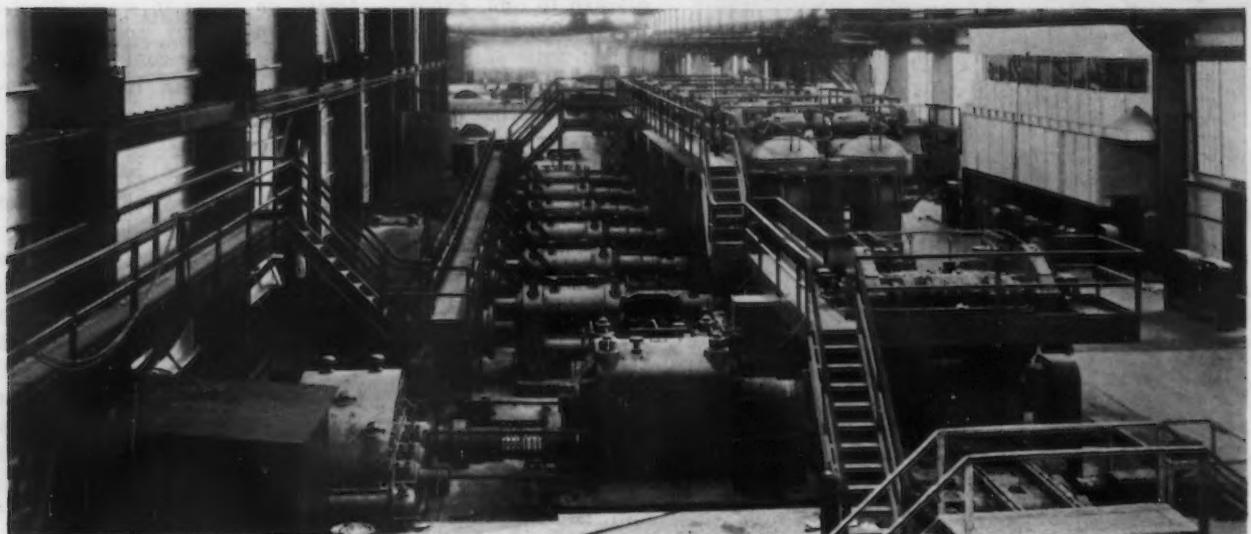
All stands in the mill and the major portion of its auxiliary equipment are driven individually by 765 electric motors, ranging from $\frac{1}{4}$ to 3500 hp. For cooling the main mill motors, 600,000 cu.

ft. per min. of cleaned air is required. The buildings are equipped with 12 electric overhead traveling cranes of 15 to 60 ton capacity.

Power for operating the mill is generated at the Ohio works of the Carnegie-Illinois Steel Corp., at 6600 volts. It is stepped up to 44,000 volts by means of transformers and transmitted to the

McDonald mills, where it is stepped down to 6600, 220 and 110 volts by means of transformers. The above 6600 volt alternating current is converted by means of motor generator sets to direct current, 600 and 250 volts.

The ground was broken for the construction of this mill on Jan. 17, 1935.



Nitricastiron Cylinder Sleeves

By A. T. COLWELL

Director of Engineering, Thompson Products, Inc., Cleveland



CYLINDER sleeves are being more widely used in bus and truck motors. These are both the dry and wet types. It has been found that the ordinary gray iron block does not resist wear for a sufficient period in heavy duty motors. Frequently cost of overhaul is considerable, in addition to tying up the equipment. Formerly 25,000 to 30,000 miles of hard operation necessitated overhaul; with alloy sleeves this has been increased to 75,000 to 200,000 miles. Tests indicate that Nitricastiron sleeves will further increase this mileage to a total of 300,000 to 400,000 miles without any service being necessary on the block itself. It will be necessary to replace pistons and rings during this period, depending upon the operating conditions, but the block itself needs no attention.

Hardened cylinder liners present very definite advantages over the gray iron block. The principal causes of wear in cylinders are believed to be the following:

1. Corrosion, principally at low operating temperatures while the block is below the dew point. This corrosion is caused by carbonic acid, sulphuric or hydrochloric acid. The carbonic acid is a product of combustion, carbon dioxide uniting with water. Impurities in fuel or oil may cause other acids to be present.

2. Deformation of the cylinder due to the high pressure of explosion and impact of the rings. The pressures are highest at the top of the cylinder and most wear occurs there, causing a bell mouth condition. These pressures are particularly high in Diesel motors.

3. Deformation of cylinders due to improper head installation. It has been definitely proved that in the cold condition cylinders distort when heads are improperly attached.

4. Abrasion by the rings, particularly if air cleaners are not functioning properly.

5. Lack of oil film at the top of the bore.

To overcome the above conditions it is essential that the cylinder have high hardness. The cylinder must have strength and soundness, and be free from excessive distortion during operation. It must also be corrosion-resistant to a fair degree.

Various materials have been tested as cylinder liners, a hardened chrome-nickel iron being the best of the conventional sleeves. This material will Brinell about 500. It can be reboored in the motor several times for oversize pistons and rings.

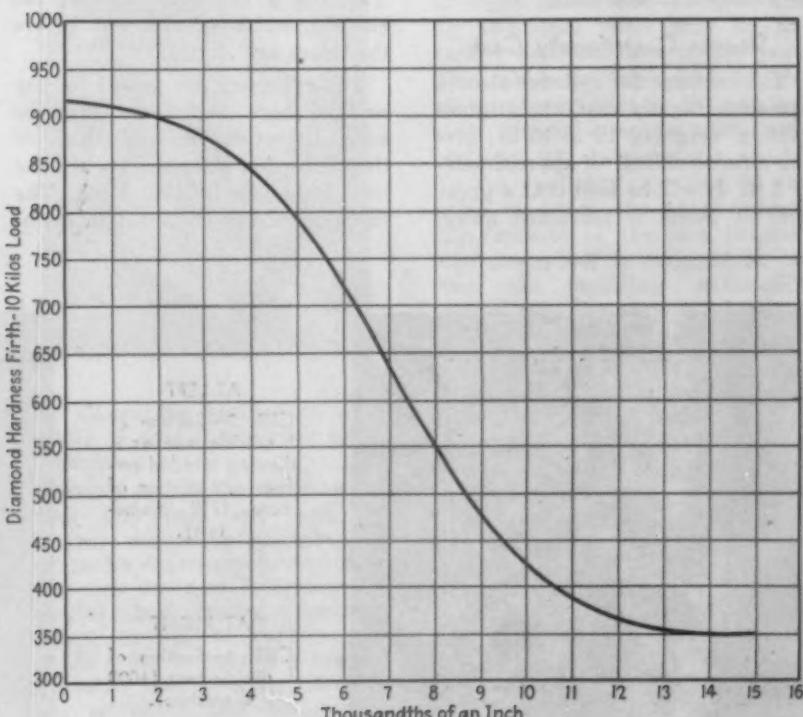
Analysis of Nitricastiron

Nitricastiron is a special grade of iron which is nitrided on the

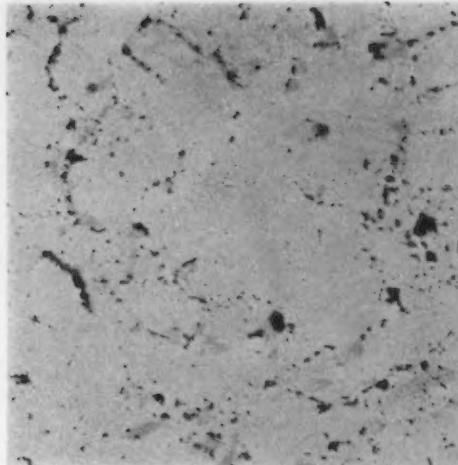
bore surface. The hardness will be 800 to 1000 Brinell for a depth of 0.004 to 0.006 in. The iron analysis is as follows:

	Per Cent
Total carbon.....	2.93
Graphitic carbon.....	2.31
Combined carbon.....	0.62
Phosphorus.....	0.058
Sulphur.....	0.029
Manganese.....	0.76
Silicon.....	2.69
Chromium.....	1.28
Vanadium.....	0.16
Molybdenum.....	0.24
Aluminum.....	1.01

The high hardness obtained on the nitrided sleeve overcomes to a great degree the principal causes of wear outlined above. Bores with high hardness introduce high oil consumption if the ring installa-

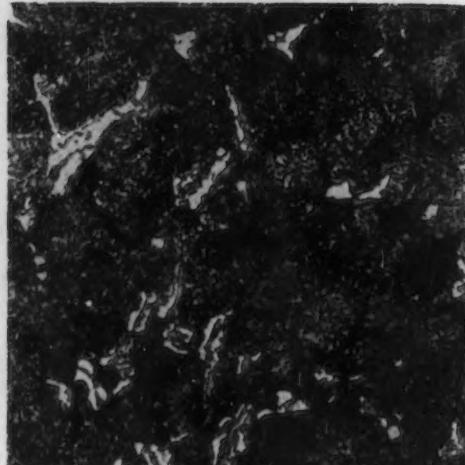


Test showing that case is hardest on the very outside.



AT LEFT

FIG. 1—Section of core material, unetched (250 diameters).



AT RIGHT

FIG. 2—Same section as Fig. 1, etched (250 diameters).

tion is not properly made. Our present experience indicates that dead rings with expanders behind them are best for controlling oil under these conditions. This applies to both oil and compression rings. The friction loss is very little with such an installation, because the coefficient of friction on the very hard nitrided iron is quite low. In some installations the rings have been tin plated, and this allows them to start sealing oil immediately, without the usual loss until they have seated. With ordinary installations it is a considerable time before the rings seat, but with the special installation mentioned above, very good oil control is obtained immediately.

Sleeves Centrifugally Cast

The castings for cylinder sleeves are centrifugally cast, the original casting weighing 12 to 15 lb., giving a finished liner of approximately 3 lb. It will be seen that a great deal of metal is machined away,

this being done to reach the dense, perfect material on the interior of the liner. The liners are tin plated on the outside surface after machining, to prevent nitriding. They are then nitrided at approximately 950 deg. F. for 65 hr. in a conventional nitriding furnace. A case up to approximately 0.015 in. is obtained, the hardness tapering off in accordance with the chart.

It will be seen from the chart that the very outside of the case is the most desirable. For this reason, very little material should be honed away after installation, and our field experiments indicate that a total of 0.002 in. of honing will clean up practically all distortion. There is a nitriding fuzz on the surface which is removed before the liners are shipped.

The cylinders are honed to size on the bore and there may be some distortion present. Much of this distortion disappears when the liner is pressed into the block. The liners should be installed in cylin-

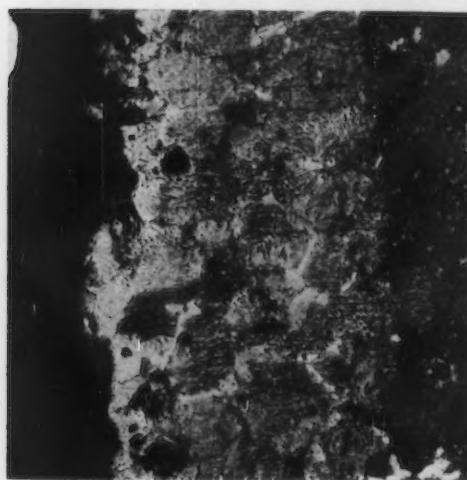
ders 1, 3 and 5 and then 2, 4 and 6, to minimize distortion. A slight amount of honing after installation will cause the bore to clean up.

Growth Allowed For

There is a small growth during nitriding, which varies with size and thickness. This may be as high as 0.001 in. and is allowed for in the size of the bore before it is placed in the furnace.

Depending upon diameter, the liners are assembled with a press-fit of 0.0015 to 0.0025 in. The outside may be coated with linseed oil to facilitate the pressing operation. Heating the block in boiling water is a help and chilling the liners in dry ice further decreases the resistance of installation. In the ordinary repair shop liners are satisfactorily installed without either of the above refinements.

This liner is being introduced in America by Thompson Products, Inc. It has been used to a small extent in Europe and reports on its



AT LEFT

FIG. 3—Section of outside surface, showing nitrided surface and portion of core (250 diameters).



AT RIGHT

FIG. 4—Section of nitride case (1000 diameters).

performance there are excellent. The liners must be made with great care and control from the initial casting through the nitriding process. Again, during installation, considerable care should be exercised in getting proper fits.

When the liner is properly made and installed, it operates better than any known liner today. With the ring installation mentioned above, oil consumption is very low at the start and remains so for a comparatively long time, gradually increasing as the piston and rings wear. Practically all wear occurs

on the moving parts, which is a saving in reconditioning the motor.

Experience in Use

Operators of light trucks average replacing piston rings and completely reconditioning cylinders, including piston pins and rings, as follows:

At 25,000 miles replace rings.
At 40,000 miles recondition cylinders, replace pistons, pins and rings.
At 65,000 miles replace rings.
At 80,000 miles recondition cylinders, etc.
At 105,000 miles replace rings.
At 120,000 miles recondition cylinders, etc.

At 145,000 miles replace rings.
At 160,000 miles recondition cylinders.
At 185,000 miles replace rings.
At 200,000 miles recondition cylinders, etc.

A cylinder liner which will run from 300,000 to 400,000 miles will show a tremendous saving in the reconditioning of cylinders. While gray iron blocks and alloy sleeves can be reconditioned a number of times, this is not true with Nitri-castiron. The small amount of wear makes it unnecessary, the entire set of sleeves being replaced after 300,000 to 400,000 miles if the block is worth salvaging.

Cable-Type Highway Guard Introduced

USE of steel for highway guard rails is expected to be increased and greater protection provided for the motor car traveling public by the bringing out of an improved type of guard by the American Steel & Wire Co. This is a cable-type guard which is designated by the company as its Multisafety cable highway guard.

The outstanding new feature of this guard, which is a modernization of the commonly used two-cable guard, is the mounting of the rail members or cables upon resilient offset brackets. These brackets are of strip steel approaching a circle in form, with overlapping ends and having slotted holes in the front through which the cables pass. These slots hold the cables to proper spacing and permit the free sliding of the cables in either direction at each post connection. The ends of the slotted holes are rounded inwardly to eliminate sharp edges. The slots are sufficiently wide to allow ample clearance of the cables.

The cables are held in the slots by an oval stay pin which can be readily installed or removed by prying open the ends of the post bracket. For attachment to the post, the bracket has either a single hole in the back or two slotted holes which permit the bracket to be tilted. The method of fastening the bracket to the



post allows the bracket to move slightly in case it is struck by an automobile.

Serving as a buffer between the cables and post and with its efficiency depending on the steel used in its construction, numerous tests were made to determine the material best suited for the bracket, as well as the best design, in order to provide a bracket that, after heat treating, has desired resiliency and the proper toughness to withstand severe shocks. The steel chosen as most

suitable has a chemical composition of 0.60 to 0.75 per cent carbon, 0.40 to 0.70 per cent manganese, 0.05 per cent maximum sulphur and 0.04 per cent maximum phosphorus.

For the rail members, three, four or eight cables may be used and an additional cable may be attached near the top of the post. The cables are tightened by the adjustment of take-up bolts at end posts without attention to the connections at intermediate posts. To the resiliency provided by the cable is added the shock-absorbing features of the post bracket. The guard rail is designed to deflect the colliding automobile rather than to stop it abruptly. The contacting surface is smooth, offset from posts and free from obstructions in order that it may guide a car along the roadway.

With cables unattached except at the end posts, any sag will be taken up and drawn to the point of impact to cushion the blow, and the stress exerted by the force of the impact against the cable is transmitted in tension along the cables to the anchorages.

With the brackets serving as buffers between the cables and posts, the danger of the breaking of posts when an automobile runs into the guard rail is reduced.



Improvements in Production

High-Speed Crankshaft Milling On New Production Miller

A VERTICAL movement of upper and lower cutter spindle arbors, in conjunction with horizontal table movement, provides the means for securing a square bottom or square cut on finished milled locating pad surfaces on crankshafts, in the design of a new machine announced by the Producto Machine Co., Bridgeport, Conn. The illustration is of milling locating pads preparatory to the center turning of bearings on production lathes.

The work is mounted between centers and an additional equalizing device is used to support and keep the crankshaft properly in line for securing the required finish. All cutter and table movements are cam controlled and synchronized.

After the work piece has been positioned, a feed lever starts the downward feed of the upper cutter spindle bearing and the upward feed of the lower cutter spindle bearing. The table then moves horizontally to finish the cut. At the finish of the cut, reverse action re-positions the cutters for the next piece. Convenience in handling crankshafts is featured; the

distance from floor to center of the head and tailstock is 44 in., and the distance from the floor to the top of the table is 34 in. Base size is 112 x 52 in. Total weight is 16,000 lb. A 10-hp. motor is employed. Production time is given as 60 to 65 shafts per hr., floor to floor.

have friction dials graduated to thousandths of an in.

Hand wheels for traverse and vertical feed have clutch throw out. The working table is 20 x 6 in. with 3 T slots, 7/16 in. wide. Range, 13 1/4 in. longitudinal, 6 in. traverse, 7 in. vertical. Distance from center of spindle to table, 7 in. at lowest position. Spindle collet capacity 1 in.; ball thrust draw spindle.

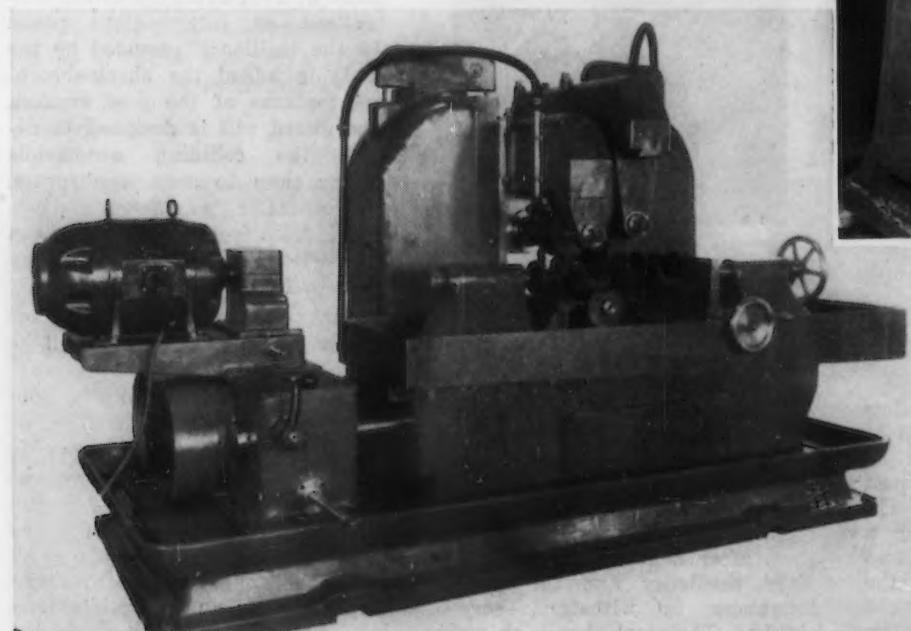
Arbor 7/8 in. diameter, 7 in. long with spacers and nut. Greatest distance from end of spindle to bronze bushing in arbor support 10 1/4 in. Weight 825 lbs.

New Toolroom Miller With Simple Control

UNDER design specifications for toolroom and laboratory use, Hardinge Bros., Inc., Elmira, N. Y., have brought out the precision milling machine illustrated.

Drive is by inclosed endless belt from a two-speed reversible motor to a three-step pulley to give six forward and six reverse speeds, 120 to 1190 r.p.m.

Headstock levers operate two electrical motor controls, one for low-stop-high and the other for forward-reverse speeds. Each lever is provided with stops for location of speed position. Feed screws revolve in long adjustable nuts and



ABOVE

NEW toolroom miller headstock levers, with position stops, operate two electrical motor speed controls.

• • •

AT LEFT

CRANKSHAFT milling is by synchronized cam control of all cutter and table movements.

and Shop Equipment . . .



Openside Boring Machine Utilizes Tubular Steel Way

ABILITY to perform milling, drilling, boring and thread cutting operations on one work piece at a single setting, is embodied in an 8-in. bar, openside, all electric machine designed and built by the Ingersoll Milling Machine Co., Rockford, Ill. The machine is one of the largest of its type and can work at any point on an area 16 ft. by 8 ft. at right angles to the surface of the table.

Facility of control and manipulation are features. Major adjustments and settings are through the use of a limited number of levers, while minor adjustments are by an electric pendant control. Operation is facilitated by the control feature, in that the operator has only to "feel" his way with five adjustments of his feed and speed variables, until he gets maximum performance from machine and tools.

The boring bar can be located within a few inches of the work without rotating it. Bar speed can be increased or decreased by

small increments during cutting. Used as a miller, operations can pass into rapid traverse from a feeding cycle and drop back into feed again quickly. Movements are obtained by pressing a designated button on the control pendant.

A hardened and ground steel tubular way having a reservoir above the sliding surfaces is perforated with two series of holes at 12-in. intervals along its entire length. Oil is forced into the tube at one point in the bed, displacing already held oil on to the ways through the spaced holes, thus maintaining constant lubrication of the ways.

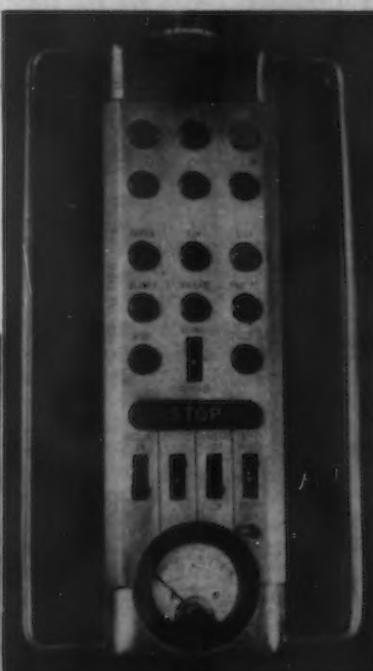
"Offset way" design is for two purposes; first, to bring the boring bar as close to the way as possible; second, to permit locating the main drive gear close to the spindle nose.

Bar feed is by a feed screw located in the center of the bar. Side thrusts are eliminated because of a continuous straight-line push in

the direction of feed. The table is driven in the manner of screw and nut sections; the nut is reproduced in this drive by a cut-away section representing a one-third section of the nut, fastened to the underside and extending the entire length of the table. The screw is replaced by a short section of worm parallel and in contact with it. Gear teeth are cut integral with the worm teeth, and worm functions as a helical gear as well as a worm. This permits use both as a driver and also a driven member.

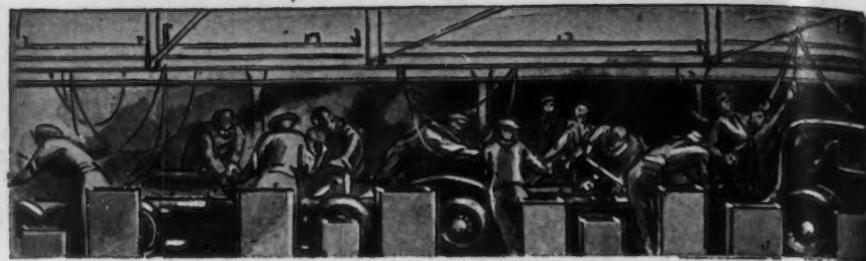
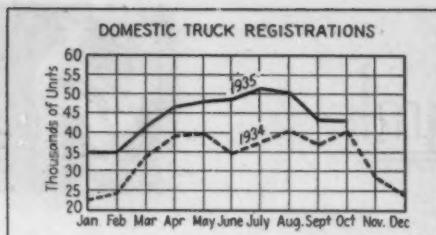
Maximum table travel is provided, as is high-speed operation of all revolving parts.

Approximately 50 hp. meets total power requirements. Shipping weight is 128,000 lbs.



"OFF-SET" position of tubular design steel way features this pendant controlled production equipment weighing 128,000 lbs.





THIS WEEK ON THE

January Production Promises To Be Around 400,000 Units

DETROIT, Dec. 17.

THIS is an especially joyous Christmas season for the automobile industry. Assemblies are hovering around 400,000 a month, a figure considered excellent even in the spring peak season, yet manufacturers are behind in making retail deliveries. Payrolls are large enough to make one's eyes bulge. During the past three months, for instance, Buick has paid its employees \$6,371,727 in wages, compared with \$2,391,438 in the same period of last year.

Thanks to the thumping operations of motor car companies, Detroit's welfare load today is lower than at any time in the past five years. There are 18,886 families on relief, half of whom are listed as having "unemployable" members, as against around 60,000 families a year ago. In Flint, Mich., a General Motors city, Christmas buying is up 66.5 per cent from last year and the number of families on welfare has declined 71.7 per cent. Compared with December, 1934, gains in Flint are as follows: Building permits, 142 per cent; bank debits, 78 per cent; bank clearings, 88 per cent; street car passengers, 53 per cent; and car loadings, 174 per cent.

These details are cited to illustrate the extraordinary recovery in southern Michigan. What is more, this is not looked upon as a "flash-in-the-pan" recovery, but one which will hold through the winter. That railroads are reaping some of the benefits from high automotive operations is proved by the dispatch of 750 carloads of

finished automobiles in a single day by the Michigan Central, most of them destined for the Pacific Coast and other western points.

Retail Sales High

Retail car sales in the first 10 days of December kept up the swift pace set in November. The sales drive by many companies to sell new passenger cars as Christmas presents has been a success; in Cadillac's case, half the orders wired by dealers in the last two weeks have specified shipment in time for Christmas delivery. With the worst weather of the winter immediately ahead, retail buyers are fighting to get cars for which they have placed orders, in many cases bringing to bear every possible influence at the factories to secure preferential treatment.

There still is no evidence of any relaxation in the production rate in the near future. Ford is expecting to build at least 110,000 units this month, even more in January and 150,000 or more in February, expanding its output as it augments dealers' stocks for the spring season. Chrysler has as its goal during December 100,000 cars and the same number next month. Plymouth is moving along at full capacity and Dodge is reported to have stepped up its production to 1400 cars and trucks a day. Only the Chrysler-DeSoto division seems to lag a bit.

In General Motors ranks there are no signs of any considerable let-down. Chevrolet is committed to 100,000 units a month through

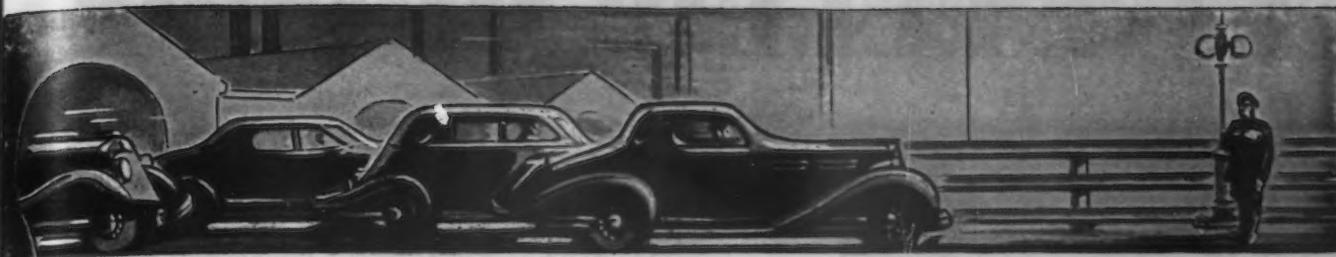
January. Pontiac and Buick are each intending to build 14,000 cars in December, with Oldsmobile's output not far from that figure. Cadillac-LaSalle is breezing along at 160 units a day, five days a week.

Hudson, a subject of comment in automotive circles because of its spurt since 1936 models were introduced, is continuing at 750 units a day. In the first nine weeks of production of the current series of Hudsons and Terraplanes, a total of 19,224 cars has come off assembly lines. Hupmobile has been turning out 400 to 500 cars a week, having been handicapped by a reported shortage of materials. Studebaker is understood to have made between 8000 and 9000 of its 1936 line.

January Output To Be 400,000 Cars

Revised estimates put November assemblies in the United States and Canada at 400,000 units and December the same. This means that production this year will be around 4,135,000 units, January output should be close to the 400,000 mark, unless projected schedules are changed.

Demand for steel gives no indication of tapering off much. There possibly isn't quite the feverish excitement of a few weeks ago about ordering ahead, but automotive steel users are still prodding mills for deliveries. District sheet mills are running at full capacity and are booked for six to eight weeks in advance. Ford, incidentally, is rolling frame stock and other sheet items on its new hot continuous



ASSEMBLY LINE

BY BURNHAM FINNEY

Detroit Editor, The Iron Age

mill, but its cold reduction mill isn't yet ready.

Pig iron shipments are paralleling in volume those of November. It is believed that little tonnage now going into consumers' hands is being stocked against advanced prices, most of it being melted as soon as received. Automotive foundries, in fact, are operating on heavy schedules. The Chrysler foundry is said to be on a basis of 24 hr. a day, seven days a week, and it is not alone in this category. The Pontiac foundry has started one of its four cupolas and one of its seven production lines, casting bearing caps and other small parts. By the end of this month it will be at 20 per cent of capacity. The entire revamping program will be completed about Jan. 15 and the pouring of motor block castings will get under way in February.

The problem which plagues the industry is to keep used car sales abreast of new car sales. Apparently car manufacturers are being successful in changing the buying habits of the public so far as new car purchases are concerned. Whether they can switch used car buyers away from their traditional ways remains to be seen. The chief trouble is that thousands of 1934 and even 1935 cars have been turned in on 1936 car sales. These cars commanded liberal allowances and are priced at \$450 to \$600. They are hard to move at this time of year. The belief persists among many observers that the mortality among dealers this winter will be disconcertingly high and will be traceable to frozen capital in their used car lots.

Large Orders For Presses

Large automobile companies and body builders are understood to have quietly contracted for most of the new press equipment which they will need for the start on 1937 models next fall. Their expenditures in the last 30 to 40 days are roughly estimated at \$1,500,000. The automotive industry is not

taking any chances on being delayed in securing large stamping presses, having reversed its traditional policy of waiting until the last minute to place orders.

In the machine tool field it appears likely that orders from automobile companies during January and February will be mostly limited to equipment needed to strengthen weak spots or to replace very old machinery too expensive to run. Little buying will be done to take care of increased production, as operations aren't likely to mount much higher than they are at present. Equipment orders for 1937 tooling programs are expected to materialize in March and April, since fall announcements undoubtedly will be continued next year. There is no reason to alter earlier predictions that capital outlays for new equipment by car manufacturers next year will be tremendous. The trade looks for engines of new design which in turn should mean substantial investments in new equipment.

Despite all the talk about Diesel-engined trucks which is heard around Detroit, the volume makers of light trucks can't get bothered about the prospective competition. It is known that a prominent automobile company will shortly tool up for production of a newly-developed Diesel in its own plant. Presumably this unit will be put on heavier-duty trucks which are used mostly on intercity hauls.

Diesel Trucks Looked For

It is believed that the effect of this company's action will be to precipitate introduction of Diesel engines designed particularly for trucks by other manufacturers, including two or three engine builders. The point is that a number of companies have been quietly but intensively developing Diesel engines, but thus far have been inclined to wait until they are positive that all the "bugs" are out. The minute one company casts

its hat into the Diesel ring, however, others will follow suit.

The light truck companies are right in not fearing Diesel-engine competition, at least for some time. Diesels probably will cost too much to sell in volume market at first. Because of their economy of operation, however, they are likely to be taken up in a big way by manufacturers of heavy-duty trucks. There is one phase of the situation deserving attention. It is a cinch that the Government is not going to let the revenue from gasoline slip away from it just because Diesels appear on the automotive scene. The first thing it will do will be to slap a sizable tax on fuel oil. Diesel engine enthusiasts, however, declare that even in the improbable event that the tax would be so heavy that oil would sell at the same price as gasoline, there would still be marked economies from the use of Diesel engines as against gasoline engines. Development of Diesel engines has been stimulated by the perfection of the fuel injection system of the Ex-Cell-O Aircraft & Tool Corp., Detroit. This system is the first to be offered by an American company in the resale market.

Detroit Notes

Chevrolet sold 111,450 used cars during November, setting a record for that month. Its new car sales, at 91,959 units, also established an all-time high for November. . . . Chevrolet produced its millionth car this year on Dec. 12, thus making 1935 the fourth year in which the company has built one million or more units. . . . Buick already has made 56,000 of its 1936 cars, or more than one-third of its projected schedule of 150,000 cars for the 1936 model season. . . . Production of trucks during the fourth quarter will establish a new high record. Output for the year is estimated at 760,000 trucks, second largest in the industry's history.

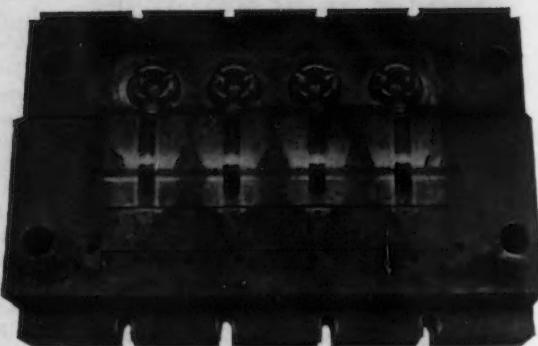
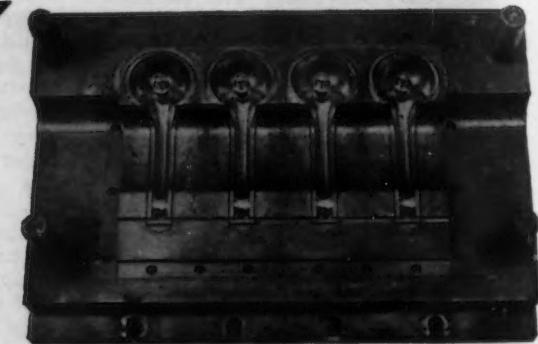
The KELLER METHOD



Die casting die for an automobile radiator grille. The roughing cut in solid steel and a small part of the finishing cut are clearly shown. The Keller Machine is of great value not only in producing the die casting impressions, but in milling the intricate parting lines, so important in accurate die casting work.



This small cam lever was machined all over in quantities of 75 to 250. A finished lever as master and a simple fixture for locating the work were all that were necessary for economical production on the Keller Machine.



Multiple impression molds for bakelite electric fan designed for handsome streamline appearance. The irregular impressions were easily and quickly milled from the solid on a Keller Automatic Tool Room Machine, Type BL.

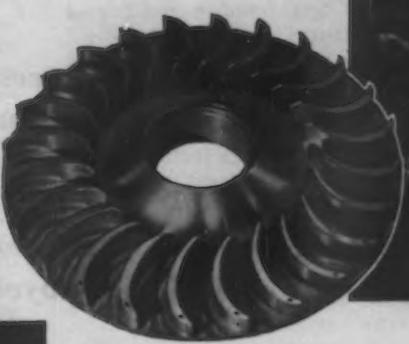
Forging dies for a heavy hook produced on a Keller Automatic Tool Room Machine. Heavy metal removing ability is an important factor in work of this nature.

PRODUCES PROFITS

Secondly, the irregularities of surface or outline are automatically produced by a delicate electric control. The electric tracer guides the machine with greater accuracy than any human eye or human hand, and it does this irrespective of the demands made on the cutter.

No hand operation can combine maximum efficiency in both of these functions. The operator who prides himself on the speed with which he can "hog out" stays well away from his finished surface or spoils the job. The operator who is highly skilled in accurate production moves slowly and cautiously, and while his finished work may be beautifully precise, time is no object and his tool never works to capacity.

The Keller Method combines both types of skill in greater measure than either man possesses. And this skill is built into a machine which is as accurate at the end of a long day as at the beginning, which employs it to your advantage year after year and which leaves your skilled human operators free for the essential hand finishing which is their rightful function.



An Automatic Tool Room Machine milling a turbine impeller wheel from a solid steel disc. As each vane is produced from the same master, identical shapes are assured.



Forming die for a hacksaw handle with artificial stone model from which it was produced on the Keller Machine. This job was produced so accurately that sample forms were readily drawn after the feed lines were ground out. After the blank was found, blanking tools were also produced on the Keller Machine.



Exhaust Manifold Core Box produced in quantity for a large automobile manufacturer. These core boxes come off the Keller Machine identical and interchangeable.

PRATT & WHITNEY Co.
HARTFORD, CONN. **KELLER DIVISION**



THIS WEEK IN WASHINGTON

Suits against New Deal legislation create serious congestion in Federal Courts.

• • •
Even more fantastic laws to be proposed in next session of the Congress.

• • •
Multiplication of investigations and hearings spells end of present "breathing spell."

• • •
NRA finally faces demobilization with dismissal of 1250 employees ordered for Jan. 1.

• • •
Curtailment promised in other alphabetical agencies in order to meet rising sentiment against huge Government expenditures.

WASHINGTON, Dec. 17.—The deluge of law suits against New Deal legislation has become so vast that the country has seen the remarkable spectacle of the Attorney General of the United States come before the Supreme Court of the District of Columbia and concede that it is physically impossible for the Government to fight every one of the injunction cases that has been filed. . . . And many more are yet to come. . . . He proposed pooling of cases against the constitutionality of the utility holding company act. . . . Rarely does an Attorney General appear in any court, especially a lower court, but the unusual has become the usual thing in Washington these days. . . . So the exceptional plea of Attorney General Homer S. Cummings came as no particular surprise. . . . But it is a striking commentary on the slapdash character of the broad range of legislation that has been jammed through a Congress that has been a mere echo of executive commands. . . .

The Attorney General made his personal appearance in the lower court several days after Solicitor General Stanley Reed suffered a physical collapse while defending the Bankhead cotton control act

before the United States Supreme Court. . . . Overburdened by the rising tide of litigation, the legal staff of the Department of Justice literally has become swamped. . . . Courageously working night and day, members of the staff plainly are endangering their health and instead of relief being in sight it looks as though the strain will grow greater unless some method is devised to concentrate and expedite the cases. . . . Certain it is that if the relief is to take the form of an increased staff it will mean the building up of an unwieldy array of legal talent. . . . The suggested pooling of cases, if it can be worked out, would seem to a layman to be sound, and, having been proposed by the Attorney General, it must have legal merit. . . . The difficulty seems to be in choosing the case to be tested because of the different phases of suits involving identical acts. . . . Business interests and in-

tors are being hurt by delay and the Government finds its hands tied in enforcing the challenged laws. . . . It is too late to say it should never have permitted itself to get into such a mess. . . . As a matter of fairness to both sides it is hoped that they will push litigation to as early a conclusion as is possible and that neither will interject unnecessary obstacles to this end. . . .

At best, however, it promises to take considerable time before the big slate can be wiped clean by action of the United States Supreme Court, itself loaded down with cases and with more on the way. . . . In all, the Government faces some 2500 law suits, with AAA the chief object of onslaught, having some 1500 processing tax injunctions against it. . . .

Heading for the Supreme Court also are cases against such laws as the Wagner-Connery labor dis-

utes act, and the Guffey-Snyder coal act. . . . Probably the first test case involving the former act will be that against the Greyhound Lines, Inc., motor bus subsidiary of the Pennsylvania railroad. . . . The National Labor Relations Board has filed with the United States Circuit Court of Appeals at Philadelphia its first order requiring the Pennsylvania Greyhound Lines, Inc., to "cease and desist" from interfering with union activity of its employees and early consideration of the case is expected to be asked of the Supreme Court. Here again it is hoped that this or some similar test case will be so comprehensive that a decision will take into account fully the widespread attacks by industry on the act. . . . So far, six actions for injunctions against the board have been begun in district courts, whose jurisdiction is being questioned by the board. . . . Up to Dec. 7, the board and its 21 regional offices had handled 350 cases and 86 had been settled through negotiations or by withdrawal of charges because of lack of evidence to sustain charges of unfair labor practices. . . . Incidentally, the split within the American Federation of Labor over the industrial-craft union issue is proving a problem for the board, as admitted by Chairman Madden. . . . He said the board will not make a decision until a case comes before it. . . . "Meanwhile, we won't have any business being pro-craft, pro-industrial, or pro-anything," said Mr. Madden. . . .

Indications are that the first test case involving the Guffey-Snyder act to come before the Supreme Court will be that started by President J. W. Walter, of the Carter Coal Co. of West Virginia, before the Supreme Court of the District of Columbia. . . . Justice Jesse C. Adkins last week granted a permanent injunction relieving the firm of payment of the 13½ per cent penalty tax which had accrued up to date. . . . He also granted a temporary injunction restraining the Government from collection of the tax pending the outcome of an appeal to the United States Supreme Court. . . . The Government announced it would appeal the permanent injunction, holding that the injunction is "illogical" because the Supreme Court may sustain the act and thus require payment of the penalty accumulated since Nov. 1 when the tax became effective. . . . In the previous oral decision, Justice Adkins held unconstitutional provisions of the act as to hours and wages through collective bargaining but sustained other provisions. . . . The act is

under attack in a number of courts over the country. . . .

▼ ▼ ▼

But More Legislation Is Proposed

These widespread moves against New Deal legislation, however, will not stop efforts at "socialistic" amendments to the constitution if the prediction of Representative Huddleston, Democrat, of Alabama, is true. . . . Mr. Huddleston, who led the fight against the "death sentence" clause in the utility bill, has just come out with the statement that thoughtful members of Congress fear a strong attempt will be made to add socialistic amendments to the constitution. . . . Declaring that there isn't a real lawyer in Congress who believes that such measures as the AAA and the Wagner-Connery labor disputes and the Guffey-Snyder acts are constitutional, Mr. Huddleston said that when the Supreme Court scraps them, demands will be made by some groups in Congress for changes in the constitution. . . . The Alabama Representative, not on good terms with the White House, said that President Roosevelt himself may seek changes, regardless of the Supreme Court decisions, if he is reelected by a large margin. . . . And he said that Congress will go along if it retains "most of its present trash." . . . This uncomplimentary fling at some of his colleagues by Mr. Huddleston was followed by the statement that one out of every 10 Senators and Representatives has already introduced a measure suggesting constitutional changes. . . . Actually the ratio is a little higher since it was stated there are 56 such bills pending. . . . The principal purposes of the bills, it was stated, will be to prohibit the Supreme Court from passing on the constitutionality of acts of Congress and to empower the Government to control production and distribution. . . . "Liberals," he said, are introducing most of the measures. . . . Expressing a view that undoubtedly has country-wide acceptance, the Alabama Representative said with considerable heat that the only way in which they are liberal is in the spending of other people's money. . . .

There are other "liberal" measures pending before Congress which Mr. Huddleston did not mention. . . . For instance, the bill introduced by Representative McGroarty, embodying the Townsend plan, which would pay a \$200-a-month pension to all persons over 60. . . . This is a natural offspring of Santa Claus enactments of the past three years. . . . Grotesque as it is, both the Re-

publican and Democratic parties are really more concerned over the plan than they are ready to admit.

. . . For it has attracted an amazingly large following. . . . Congress is going to be polled on the bill and members already have received a questionnaire from R. E. Clemens, co-founder with Dr. Townsend of the plan, asking them whether or not they are in favor of it and whether their help can be relied upon to pass the measure at the coming session. . . . Townsendites even say they will organize a political party. . . . In addition, Congress is to be asked to pass a \$2,000,000,000 bonus bill. . . . The general opinion is that it will be passed and enacted, even if the President vetoes it. . . .

There is also organized labor's program, including the O'Mahoney bill to license industry, the 30-hr. week bill, etc., etc., all of which were laid before the abortive industry conference by Major George L. Berry. . . . The Major is continuing this farce. It makes a good sounding board for the organized labor program. . . .

This all implies that an irresponsible majority in Congress, not only willing but anxious to wallow in the political trough if it thinks it means re-election, may put through more legislation at the forthcoming session that will pile higher and still higher the already mountainous law suits. . . .

This outlook, together with the prospect of all sorts of "probes," "investigations" and "hearings" centering around business, promises to terminate definitely the breathing spell, if any.

▼ ▼ ▼

Lewis M. Lind Heads Commerce Department's Machinery Division

Appointment of Lewis M. Lind, Lake County, Ohio, as trade commissioner, Bureau of Foreign and Domestic Commerce, Department of Commerce, who has been designated acting chief of the machinery division, was announced last week. Mr. Lind is a son of Herman Lind, Cleveland, manager of the National Machine Tool Builders' Association, and succeeds R. E. W. Harrison, who resigned in September to engage in private business.

Mr. Lind was graduated from Yale University in 1929 and later studied at the School of Foreign Service of Georgetown University, Washington; Cleveland College, and the University of Berlin. He has been serving with the National Recovery Administration since July, 1933, where he assisted in the administration of machinery codes.

He also has worked for the foreign trade department of the Cleveland Chamber of Commerce, the Malleable Iron Research Institute and the Lake City Malleable Co., Cleveland, and has been engaged in private business in connection with the development of industrial concerns.

▼ ▼ ▼

NRA Finally Faces Demobilization

Once the key of the New Deal recovery program, the National Recovery Administration is the first alphabetical agency which is rapidly to undergo demobilization. By an order yesterday, Administrator L. J. Martin served notices of dismissal, effective Jan. 1 on 1250 employees. Of this total 500 will be removed from the field staff and 750 from the Washington force, now occupying parts of four buildings in the capital.

The sharpest reductions were in the Division of Review. This division's staff is engaged largely in making surveys of industries. It is reported that as a result of the dismissals these surveys will be considerably abridged, except possibly with regard to some industries.

Since the NRA was "skeletonized" as the result of the Schechter decision by the Supreme Court last May, it has had an organization of about 2300 employees. With the reduction in personnel by 1250 this leaves a force of about 1050 of which 900 are in Washington and 150 in the field. The latter force is engaged in making a study to determine so-called deviations by industries from old code wages and hours.

The order entirely abolishes the so-called Government contracts division. This division had been set up in anticipation of passage of the Walsh bill. This measure, which failed of enactment at the last session of Congress, would require adherence to code wages and hours on Government contracts.

It is expected that efforts will be made at the forthcoming session of Congress to have the bill enacted. Should it be passed there is already an existing Government force to administer it. It consists of a division in the Department of Labor. Previously the Walsh bill was supported by the Administration. Whether it will again urge its enactment is not known. However, in the event it does not, it is known that organized labor will make a strong attempt to push it to passage.

The ultimate disposal of the 1050 employees remaining on the NRA payroll has not been made known.

Assuring further cuts are not made at once, it is believed that they will be later or that the staff will be transferred to another Government department. The Business Advisory Council of the Department of Commerce has recommended that the "skeletonized" NRA be transferred to that department.

It is also believed that Maj. George L. Berry, coordinator for industrial cooperation, had hopes of taking over the remnants of NRA to administer the so-called National Council for Industrial Progress. Inasmuch as his conference for setting up a council has completely failed and wound up in a fiasco, such a hope clearly is out of the question. This is despite the fact that Major Berry has announced that he will proceed with the setting up of the council. The conference resulted in the selection by a few small industries of delegates to the council. It is well realized that with such a small representation, the council could not even approach such an ambitious program as Major Berry had in mind. For this reason there is a growing belief in some quarters that the plan will be entirely abandoned. Its only strong support comes from organized labor. Many industrialists who turned thumbs down on the Berry program think it was actually sponsored by organized labor, and color to this view was given by the fact that organized labor's legislative program was laid before groups at the abortive conference.

The move to demobilize NRA is reported to be especially significant as marking the first real step to curtail the forthcoming budget which the Administration has indicated will be sharply reduced. It is expected that other alphabetical agencies likewise will be either greatly curtailed or entirely abolished both as a matter of meeting rising sentiment against huge Government expenditures and Federal bureaucracy.

NLRB Orders Reinstatement of Discharged Employees

The National Labor Relations Board on Monday ordered the Fruehauf Trailer Co., Detroit, to reinstate employees which, it was claimed, were discharged for union activities. It was one of the first cases heard by the board which was set up under the Wagner-Connery labor disputes act.

Supreme Court Decision On Guffey-Snyder Act To Be Expedited

Moves for an early decision by the United States Supreme Court as to the constitutionality of the Guffey-Snyder coal act were made yesterday. Attorneys for J. W. Carter, president, Carter Coal Co., asked the court for a review of the case Mr. Carter brought against the Government attacking the law as unconstitutional.

It is understood that the Government has joined in the request for an early decision. Recently the Supreme Court of the District of Columbia held the law to be unconstitutional except as to its wage and hour provisions. The case was then taken to Court of Appeals of the District of Columbia and the action taken yesterday was intended to expedite a final decision.

Simplified Practice Recommendations for Forged Hammers

The Bureau of Standards has announced completion of the simplified practice study of the forged hammer industry, and has issued its recommendations in pamphlet form. The project, undertaken jointly by the bureau and prominent members of the trade, represents an endeavor to coordinate manufacturing practices, chiefly by the elimination of excess variety.

The committee conducted a thorough survey of demand of various patterns, sizes, and grades of hammers, and has drawn up a list of such selections as best appear to fulfill the needs of consumption and the requirements of manufacturers. To date, 256 major associations identified with the industry have signified acceptance of the plan. It is hoped all remaining parties will speedily familiarize themselves with the recommendations and participate therein, as the benefits to be gained depend upon universal cooperation. Copies of the study can be secured from the Superintendent of Documents, Washington. Inquiry should specify Simplified Practice Recommendations R159-35.

Correction

In an article appearing on page 27 of The Iron Age, Aug. 15, entitled "Flexibility and Economy Achieved in Modernization of Niles Sheet Mill" reference was made to the bar heating furnace and also the pack heating furnaces as of "the Flinn & Drefein type and built by the Wean Engineering Co." The statement should have read as follows: "this furnace and also the pack heating furnaces are of the Flinn & Drefein type and were built by that company."

Construction Census For 1935 Planned

A NATION-WIDE census of construction is to be made by the Bureau of the Census as part of the census of business, beginning Jan. 2 and covering 1935 operations. The first census of construction was made in 1929 and has been widely used in connection with the problems of the construction industry. Up-to-date information for this important industry will be available from the 1935 Census.

Figures will be secured for the number of persons employed by contractors, man-hours of work in 1935, disbursements for salaries and wages, value of contracts and orders received during 1935, value of construction work performed, and expenditures for materials. In addition, information is to be obtained for the location of the business establishments that are regularly maintained by contractors, the legal form of organization (firm or corporation), and the kind of construction business in which they were engaged during 1935.

To augment the value of the construction statistics, some further information will be collected in detail at the request of the industry. Two sets of figures, for example, will be secured for persons employed. One will give an analysis of employees by broad occupational groups for a stated one-week pay period (that ending nearest Oct. 26 has been designated). The other will present the total count of employees on the fifteenth of each month of 1935. As to work performed, the schedule form is arranged to show five separate types of construction, further classed as new construction or remodeling, repairs and maintenance.

Demonstrates Rise in Industrial Taxes

USING the results of last year as a basis, Continental Can Co., Inc., New York, estimates that approximately \$1 a share will be required to cover its tax bill for 1935. By 1938, assuming no further changes are made or new legislation is enacted in the meantime, the amount required, including taxes under the Administration's social security measures, will approximate \$1.35 a share. These figures, the company states in a message sent to stockholders, do not include sales, processing and other taxes applying to purchases of supplies.

"The tremendous expenditures



NALOY, for the past five years, has proved its marked superiority and economy over high speed steel for broaches. It will negotiate harder and tougher materials. It offers the broach user from 50 to 100% more work per grind, and the same increase in total number of pieces, broached during the life of the tool.

National Broach engineers are at your service for consultation on any broaching problem. Write for specific information.

NATIONAL BROACH AND MACHINE CO.
SHOEMAKER AND ST. JEAN
DETROIT, MICHIGAN

planned by our Government over the next few years, added to the large current deficit, make further increases in taxation inevitable," the message states in discussing taxes as one of the major items of expense over which the management has little or no control.

"In the past," says the statement, "the primary object of taxation has been to create revenue to meet the cost of operating our Government. Recently, however, our Federal Government has adopted a graduated corporation

income tax with apparently new motives. Under this measure, larger incomes are taxed at higher rates regardless of the amount of capital invested in the business. This results in discriminating against the larger corporations and their stockholders. The importance of this measure to every stockholder of a large business lies not so much in the immediate effects of this particular tax legislation, but in the possibility of the further extension and application of this principle in the future.



NEWS OF THE WEEK

Jones & Laughlin Steel To Build Wide Continuous Sheet Mill in Pittsburgh

A NEW wide continuous strip-sheet mill, to cost approximately \$25,000,000, is included in a \$40,000,000 plan for new mills and other improvements and expansion of the works of the Jones & Laughlin Steel Corp., Pittsburgh. The plan, which was revealed in a letter to the corporation's stockholders, calls for the approval by stockholders of the creation of a \$100,000,000 first mortgage upon the properties of the corporation and certain of its subsidiaries under which it is proposed to issue and sell at this time bonds to the amount of \$40,000,000.

The continuous strip-sheet plant proposed would be of the most modern type and would have a monthly capacity of approximately 60,000 gross tons of product consisting of hot and cold-rolled sheets, wide strip, light plates, skelp, and also hot-rolled strip coils for the Aliquippa works tin plate department. The plant would comprise a hot rolling division consisting of a 4-high roll type of hot mill train with a full complement of heating furnaces, tables, shears, trimmers, levellers, pilers, coilers and other necessary equipment for finishing and shipping hot rolled material to the consuming trade, cold-rolling division, tin plate and pipe mills at Aliquippa and for other inter-plant processing; also a cold-rolling division consisting of 4-high roll type of cold-rolling mills set in tandem and singly, and with full complement of finishing equipment, including picklers, heat-treating furnaces, shears, trimmers, levellers and shipping facilities. The entire plant would be housed in economically designed buildings,

equipped with proper electric overhead traveling cranes.

Cold Reduced Tin Plate In Demand

Installation of the wide strip-sheet plant would be at the Pittsburgh works. An important factor in the decision to build the mill is the corporation's belief that the preference for cold reduced tin plate is rapidly becoming such that the maintenance by the corporation of its position in the tin plate trade demands that it establish competitive facilities. A close study had been made of the various factors affecting operating and other problems of the corporation's Aliquippa works and Pittsburgh works.

Conclusions were reached to the effect that, while the steel products of the Aliquippa works are sufficiently diversified to insure the operation of this works at a rate commensurate with that of the steel industry and at the same time yield a per-ton profit even when operating at low rates of capacity, the products of the Pittsburgh works, because they are largely used in construction, by the railroads and by other so-called capital goods industries, make it impossible to operate the Pittsburgh works profitably with its present line of products and the load factor they contribute. Full consideration had been given to the possibility of making any of all major steel products, including those not now manufactured by the corporation, viz.: alloy steels, heavy structural section, standard rails and strip and sheets. The conclusion reached pointed out that strip and sheets best meet the corporation's requirements for in-

creased consumer goods tonnage, as well as promising the best expanding market for the future.

The addition of strip and sheets to the line of products manufactured by the corporation will enable it to participate in the production of about 75 per cent of the tonnage of steel products going into the manufacture of automobiles, instead of only 20 per cent in which it is now able to share.

Included in the purposes of the new \$40,000,000 financing, in addition to \$25,000,000 for the new strip and sheet mill, are provisions for working capital required for reimbursement of expenditures already made and yet to be made for the \$5,000,000 electrically driven 44-in. blooming mill in the Pittsburgh works, already under construction; also \$1,500,000 for additions and improvements to the 4-high cold reducing mill in the Aliquippa works; \$3,000,000 for capital expenditures already made and soon to be made and for other working capital requirements. At the same time, it is proposed to retire the present \$5,248,000 of bonds outstanding from an issue of \$30,000,000 authorized in 1909, but of which only \$25,000,000 was sold.

A special meeting of stockholders has been called for Feb. 14, 1936, to consider and vote on the proposed mortgage.

A comprehensive discussion of the bearing problems of machine spindles, and of the types of extra-precision ball bearings required in such applications, has just been prepared by the Fafnir Bearing Company, New Britain, Conn. The new bulletin, "Super-Precision Ball Bearings for Spindles" describes in particular the specifications and methods of applications.

Labor's Share of Sheet Steel Dollar Has Increased 17 Per Cent Since 1929

ABOR'S share of each dollar received by the steel industry from the sale of sheet steel was 17 per cent greater in 1934 than it was in 1929, according to calculations by the American Iron and Steel Institute from data furnished by one prominent and typical manufacturer.

In 1934, payrolls took 38.2c. out of each dollar of sheet sales compared with 32.6c. in 1929. Over the 12 years, 1923-1934, payrolls averaged approximately 36.6c. out of each sheet steel dollar.

From 1923 to 1934 sheet steel prices declined 46.5 per cent, although great improvement was made in the quality of the sheets produced during the period. The steel industry received an average of \$100.15 per ton for sheets in 1923, but in 1934 the average price received per ton of steel sheets sold was only \$53.66.

The sharp decline in sheet steel

prices has greatly reduced the steel industry's income from the sale of this product. Although production of steel sheets in 1934 totaling 3,203,000 tons was only 8.6 per cent below 1923 when 3,503,000 gross tons were produced, estimated gross sales value of the product declined 51 per cent during the same period.

The following table shows the average price of a ton of sheet steel since 1923, and labor's share of the receipts from sheet steel sales in each of these years:

Year	Average Price per Ton of Sheets	Payrolls per Dollar of Sheet Sales
1923	\$100.15	37.7c.
1924	95.51	39.6c.
1925	83.34	36.8c.
1926	83.18	35.6c.
1927	79.17	35.4c.
1928	70.24	34.7c.
1929	75.87	32.6c.
1930	68.74	38.2c.
1931	58.89	36.7c.
1932	51.83	36.4c.
1933	45.98	37.0c.
1934	53.66	38.2c.

toys which are selling rapidly, such as the imaginative twenty-fifth century disintegrator pistols and rocket ships, and the children's bagatelle games are made largely of steel.

Sheet and strip steel are the two steel products used in the largest tonnages by toy makers, although tin plate and black plate are not far behind. Steel tubing, both seamless and welded, and cast iron are also important raw materials for toys.

Chester Will Head Manufacturers Group

C. M. CHESTER, chairman, General Foods Corp., New York, has been elected president of the National Association of Manufacturers for 1936. He succeeds C. L. Bardo, who has served two years. Mr. Chester will take office at the next board meeting in January.

The election took place at the first meeting of the new board of directors which was chosen at the annual convention of the Association last week. In addition, the board elected the following vice-presidents: F. B. Davis, president, United States Rubber Co., New York; C. S. Davis, president, Borg-Warner Corp., Chicago; Charles R. Hook, president, American Rolling Mill Co., Middletown, Ohio; George H. Houston, president, Baldwin Locomotive Works, Philadelphia; N. W. Pickering, president, Farrell-Birmingham Co., Ansonia, Conn.; S. Wells Utley, president, Detroit Steel Casting Co., Detroit; William B. Warner, chairman, McCall Co., New York; Harry A. Bullis, vice-president, General Mills, Inc., Minneapolis; S. Bayard Colgate, president, Colgate-Palmolive-Peet Co., Jersey City, N. J.; Homer L. Ferguson, president, Newport News Shipbuilding & Dry Dock Co., Newport News, Va.; Robert B. Henderson, president, Pacific Portland Cement Co., San Francisco; W. T. Holliday, president, Standard Oil Co. of Ohio, Cleveland; Walter J. Kohler, president, Kohler Co., Kohler, Wis.; F. W. Lovejoy, president, Eastman Kodak Co., Rochester, N. Y., and F. H. Willard, president, Graton & Knight Co., Worcester, Mass.

give this alloy a high degree of uniformity and physical characteristics, as well as workability. Tests extending over a year's time show that it will bend, form, stamp, seam, and weld readily. It is highly resistant to corrosion, promising many times the life of ordinary grades of steel. It will be supplied as sheets, strip, plates, bars, and structural shapes.

Toys of Steel More Popular Than Ever

MORE of the toys which will be bought for American children this Christmas will be made of steel than ever before, according to information received by the American Iron and Steel Institute.

Toy automobiles, velocipedes and scooters alone will require approximately 20,000 tons of steel, it is estimated, while an additional but incalculable tonnage will be used to make toy trains, stoves, construction sets and the thousand and one other toys made of steel.

Steel toys are established products of the toy industry, but the growing preference of children for toys that are small-scale models of articles used by adults has tended to increase the use of iron and steel. Moreover, many of the newer

The Bureau of Supplies and Accounts, Navy Department, will open bids Dec. 27 for 295 tons of plates, sheets and strip; 157 tons of shapes and 135 tons of special tees for three submarines, two to be built at the Portsmouth, N. H., and one at Mare Island, Cal., Navy Yards.

Inland Introduces High-Tensile Steel

THE Inland Steel Co., Chicago, has announced a new low-alloy, high tensile steel, designated as Hi-Steel. The minimum yield point is 60,000 lb. per sq. in. for gages lighter than $\frac{1}{4}$ in. and 55,000 lb. in heavy gages. Minimum ultimate tensile strength is 70,000 lb. per sq. in., giving it a high elastic ratio.

The elements used are said to

British Steel Markets In Holiday Lull—Potential Demand Still Light

LONDON, Dec. 16 (By Cable).—

Prompt demand for iron and steel is less urgent because of the approaching holidays and a relaxation of the embarrassing pressure is welcomed by producers. Many forward inquiries and contracts are offered for pig iron, but little business is resulting owing to shortage of supplies and increasing raw material costs. Some furnaces have switched from hematite to basic iron because of a shortage of steel scrap.

New buying steel is less active, but large contracts are expected early next year. Arrivals of Continental semi-finished steel are increasing, but pressure for British supplies still is heavy. Rails and structural steel are being heavily specified and shipbuilding steel is more active.

Tin plate forward buying is increasing in anticipation of higher coal prices and consequent higher steel prices. Some export business has been taken at scheduled prices for shipment in first quarter of 1936.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese,	
export	29
Billets, open-	
hearth	25 10s. to 25 15s.
Tin plate, per	
base box.....	18s. 9d. to 19s. 3½s.
Steel bars, open-	
hearth	27 17½s.
Beams, open-	
hearth	27 7½s.
Channels, open-	
hearth	27 12½s.
Angles, open-	
hearth	27 7½s.
Black sheets, No.	
24 gage.....	29 10s.
Galvanized sheets,	
No. 24 gage.	211 10s.

Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.

Billets, Thomas.	22 7s.
Wire rods, No. 5	
B.W.G.	24 10s.
Steel bars, mer-	
chant	23 5s.
Sheet bars	22 8s.
Plate, ¼ in. and	
up	24 2s. 6d.
Plate, 3/16 in.	
and 5 mm....	24 4s. 8d.
Sheets, ½ in....	24 9s. 8d.
Beams, Thomas.	23 2s. 6d.
Angles (Basic)...	23 2s. 6d.
Hoops and strip	
base	24 2s. 6d.
Wire, plain, No.	
8	25 7s. 6d.
Wire nails	25 15s.
Wire, barbed,	
4 pt. No. 10	
B.W.G.	28 15s.

Continental iron and steel mills are enjoying a moderate export business in European markets but overseas demand is dull. Home demand is good.

The imports agreement between the British Iron and Steel Federation and Continental Steel Cartel has been prolonged until June 8, 1936, and the next ultimate date for the conclusion of the International Thin Sheet Agreement has been postponed until then.

United Kingdom November exports of pig iron were 13,100 tons, of which 175 tons was shipped to the United States. Total exports of iron and steel were 215,800 tons.

Guernsey, Muskingum, Jackson, Licking and Butler, in Ohio, and Wood County in West Virginia.

Iron and steel plants in these districts have had an average of 44,426 employees so far this year. Last year 39,787 were employed in the plants.

The plants have a combined capacity for producing 5,114,200 gross tons of steel ingots a year, approximately 7.5 per cent of the nation's total capacity. In the first 10 months of 1934 over 3,500,000 gross tons of ingots were produced in the districts, equivalent to 82.3 per cent of capacity. During 1934 the steel plants in the districts operated at 58.6 per cent of capacity to produce nearly 3,000,000 gross tons of ingots.

British Auto Maker To Build Steel Plant

UNSTALL STEEL, LTD., recently formed subsidiary of the British Austin Motor Co., will erect a plant at Wolverhampton, England, for the manufacture of special steel sheets, forgings and stampings for Austin cars, according to a report from United States Consul W. W. Heard, Birmingham. The report says a statement issued by the Austin company emphasized the importance to British automobile manufacturers of being able to obtain their principal raw materials at favorable prices in order to compete successfully in foreign markets in which the Austin company is said to be planning greater activity.

It is anticipated, the report says, that production in the new plant will be sufficiently large to enable other British motor car makers to purchase requirements on advantageous terms. It is understood, the Consul states, that the Austin company has recently found it almost impossible to compete with at least one of its models with cars in the same class produced by an American company. The new plant, according to the report, will be equipped with the best American presses, together with every labor-saving device in order to keep prices at a level that will compare favorably with those of producers in other countries.

Ohio River Steel Payrolls High

PAYROLLS of the 40 iron and steel plants located in the North and South Ohio River steel-making districts have totaled \$47,500,000 in the first 10 months of 1935, according to the American Iron and Steel Institute. These payrolls are almost 28 per cent greater than the total paid in the first 10 months of last year. For the whole of 1934, steel payrolls in the districts amounted to \$44,254,243.

The North Ohio River district as defined by the institute comprises the cities along the Ohio River north of Parkersburg, W. Va., the counties of Belmont and Jefferson, in Ohio, and the counties of Marshall, Ohio, Brook and Hancock in West Virginia. Included in the South Ohio River district are Kentucky, Parkersburg, W. Va., the cities along the river south of Parkersburg, the counties of

When the Armington Engineering Co. was merged into the Euclid Crane & Hoist Co., Euclid, Ohio, several years ago the name Euclid-Armington Corp. was adopted. The original name of the company, the Euclid Crane & Hoist Co., has now been restored.

PERSONALS

ROBERT F. SANNER has been appointed superintendent of personnel, Duquesne, Pa., steel works, Carnegie-Illinois Steel Corp., succeeding Ross L. LEFFLER, whose appointment as manager of industrial relations for the company in the Pittsburgh district was an-

dent in charge of sales. W. C. STEVENS, chief engineer, has been made vice-president in charge of engineering. Mr. Crane is a graduate of the University of Michigan and became identified with the company 25 years ago. Mr. Stevens, who is a graduate of Cornell Uni-

years he was assistant to the superintendent of Builders Foundry Co., Providence, R. I., and later for a like period served as metallurgist of Farrel Foundry & Machine Co., Ansonia, Conn. In 1904, he became superintendent of foundries for Mackintosh-Hemphill Co. In 1914 he was made president of Wheeling Mold & Foundry Co., Wheeling, W. Va. When that company, the Duquesne Steel Foundry Co. and the Hubbard Steel



R. F. SANNER



J. J. BOOTH



G. S. CRANE



W. C. STEVENS

nounced recently in *THE IRON AGE*. Mr. Sanner started with the Carnegie Steel Co. in 1926 in the electrical department. In 1927 he was appointed assistant electrical engineer, and in 1932 he became assistant chief maintenance engineer.

JESSE J. BOOTH succeeds Mr. Sanner as assistant chief maintenance engineer. Mr. Booth began his business career with the Missouri & Kansas Bell Telephone Co. in 1910, leaving there in 1911 to accept a position with the Westinghouse Electric & Mfg. Co., East Pittsburgh. He started in 1913 in the electrical engineering department of the Edgar Thomson works, Carnegie Steel Co. In 1924 he was made assistant superintendent in the electrical department of the Gary works, National Tube Co., and since November, 1929, he has been superintendent of that department. He was president of the Association of Iron and Steel Electrical Engineers in 1931 and 1932. He has served as chairman of the Chicago section and other important committee posts in the society. He was graduated from the University of Missouri in 1910.

♦ ♦ ♦

G. S. CRANE, sales manager of Cutler-Hammer, Inc., Milwaukee, has been promoted to vice-presi-



H. E. FIELD

versity, started with the company 30 years ago in the engineering department.

♦ ♦ ♦

H. E. FIELD, who for the past five years has been vice-president of Mackintosh-Hemphill Co., Pittsburgh, has resigned to become vice-president of Continental Roll & Steel Foundry Co., with his headquarters at Pittsburgh. He has been identified with the production and sale of iron and steel rolls and castings since just after his graduation from Worcester Polytechnic Institute in 1895. For four

Foundry Co. were merged into the present Continental Roll & Steel Foundry Co. in 1930, Mr. Field returned to the Mackintosh-Hemphill Co.

♦ ♦ ♦

WOOD SANFORD, for more than 10 years associated with the Sullivan Machinery Co., Chicago, has been appointed advertising and sales promotion manager of the Harnischfeger Corp., Milwaukee, to succeed JAY FERCH, who has become assistant advertising manager of the Globe-Union Mfg. Co., Milwaukee.

♦ ♦ ♦

B. H. WHITING has been appointed district manager at Cincinnati by the Whiting Corp. His headquarters will be in the Chamber of Commerce Building. Mr. Whiting will handle sales for all Whiting lines, including electric traveling cranes, foundry equipment, railroad specialties, pulverizers and combustion equipment.

♦ ♦ ♦

W. E. GLIDDEN, formerly research engineer on metallizing at the Rock Island Arsenal, Rock Island, Ill., is now engineer for the Metallizing Engineering Co., Chicago.

♦ ♦ ♦

E. C. ROBERTS, heretofore vice-president in charge of sales of the

OBITUARY

Arco Co., Cleveland, has returned as vice-president in charge of sales to the Detroit Graphite Co., with which he had been identified for 16 years.

◆◆◆

G. E. GADDIS, for many years credit manager of the American Can Co., New York, has been made special representative in the sales department.

◆◆◆

WADE W. ERDMAN has been appointed manager of sales of dolomite and limestone products by the J. E. Baker Co., York, Pa.

◆◆◆

DAVID C. ARTHURS has been elected president of the Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill., succeeding R. K. WEBER, who has retired. L. G. SEVER has been appointed executive vice-president.

◆◆◆

G. G. VAN TUYL has been appointed Cleveland representative, with office at 18927 Winslow Road, by the Pennsylvania Pump & Compressor Co., Easton, Pa.

◆◆◆

VICTOR A. STIBOLT, formerly executive vice-president of the Rock Island Plow Co., has been appointed assistant to the president of French & Hecht, Inc., metal wheel manufacturer, Davenport, Iowa. He was at one time also identified with the Moline Plow Co.

◆◆◆

E. R. CARNELL, who has been identified with A. Milne & Co., New York, for many years, has been placed in charge of the Pittsburgh office of the company, which open on Jan. 2.

◆◆◆

HARRY ROSS JONES, of Canton, Ohio, will retire from active work in the steel industry Dec. 31. Mr. Jones was one of the pioneers in the manufacture of alloy steels and was formerly president of the United Steel Co. and the United Alloy Steel Corp., Canton, now a part of the Republic Steel Corp. He has been engaged in organizing the alloy steel division of the Youngstown Sheet & Tube Co. for the past three years. WILLIAM J. MACKENZIE succeeds Mr. Jones as head of the alloy division of the Sheet & Tube company. Mr. Mackenzie, who is a metallurgist, has been Mr. Jones' assistant for three years and formerly was vice-president of the Interstate Iron & Steel Co., Chicago, now a part of the Republic Steel Corp.

◆◆◆

WALDO C. PORTZ, formerly blast furnace superintendent, has been

made plant manager of the Perry Furnace Co., Erie, Pa., succeeding the late A. R. LONGENECKER. JOHN R. CONKLIN, who was formerly coke oven superintendent, has been made general superintendent of both ovens and blast furnaces at the Erie plant.

◆◆◆

F. E. FISHER, for the past two years metallurgist with the Western Foundry Co., Chicago, has become associated with the Chicago and St. Louis sales offices of the Sloss-Sheffield Steel & Iron Co., Birmingham. He was at one time a foundry advisor for the Bethlehem Steel Co., covering the Middle West and Eastern States.

◆◆◆

L. S. MORSE, executive engineer of the York Ice Machinery Corp., York, Pa., has been elected president of the American Society of Refrigerating Engineers. He received his technical education at the Massachusetts Institute of Technology and has been identified continuously with the York company for the past 40 years.

◆◆◆

JOHN S. GREGG has been added to the sales staff of the Milwaukee office of the Inland Steel Co. He was graduated from Carleton College in 1930 and has heretofore been identified with the Moise Steel Co., Milwaukee.

◆◆◆

EARLE W. McMULLEN, who has been vice-president and plant manager of the Ault & Wiborg Corp., has been made director of research of the Eagle-Picher Lead Co., succeeding DR. JOHN A. SCHAEFFER, who has resigned to become president of Franklin and Marshall College.

◆◆◆

ROBERT E. FRIEND, president of the Nordberg Mfg. Co., Milwaukee, will return home on Dec. 23 from a stay of two months visiting the firm's London office and touring the Continent for an investigation of business conditions and prospects.

◆◆◆

J. E. MACARTHUR, heretofore identified in an executive capacity with the Kearney & Trecker Milling Machine Corp., Milwaukee, has been appointed assistant general manager, in charge of national sales and service, of the Eclipse Counterbore Co., Detroit. He started his career as an apprentice with the Brown & Sharpe Mfg. Co. and subsequently served with the Pierce-Arrow Motor Corp., and General Motors of Canada, Ltd.

EMIL LEPINSKY, vice-president of the Advance Boiler & Tank Co., Milwaukee, died on Nov. 29, aged 46 years. He retired from active business eight months ago because of poor health.

◆◆◆

JOHN M. YOUNG, assistant to the president of the American Can Co., New York, died in that city on Dec. 1, aged 63 years.

◆◆◆

SAMUEL J. BIALOSKY, who was associated for 30 years with Bialosky Brothers & Co., scrap iron dealers, Cleveland, died Dec. 13, aged 61 years. He had long been prominent in Jewish and other philanthropic activities in Cleveland.

◆◆◆

CLOYDE HAUk, production development engineer, Osborn Mfg. Co., Cleveland, died Dec. 13, aged 51 years. He had been connected with the company for more than 20 years.

Recovery Products Being Exhibited

AN exhibition of 50 new products, known as "The Children of Recovery," and sponsored by the American Chemical Society, is being shown at Metal Products Exhibits, the permanent exhibition of metals, alloys, plastics, and finishes in the International Building, Rockefeller Center, New York.

Each of the products exhibited was selected by the society, and the whole group illustrates the essential role played by research in economic affairs. The exhibit is open daily from 10 a. m. to 6 p. m., and is free to the public. Many of the products pertain to the metal and metal finishing and cleaning fields.

Manufacturers in metropolitan Detroit are buying farther ahead, according to the November survey of the Purchasing Agents Association of Detroit. Ten per cent of the companies are making commitments 30 days in advance, 36 per cent are stocking 60 days, 39 per cent for 90 days and 6 per cent for six months. For the first time in many months no reporting member indicated that business had fallen off during the month.

Capital Goods Index Rises Slightly

THE IRON AGE index of activity in the capital goods industries has advanced 0.3 points since Dec. 7, but remains slightly beneath the peak figure of 81 per cent, established in the last week of November. A reduction in steel mill operating rates was not effective in lowering the combined index, since other factors strengthened sufficiently to more than absorb this loss.

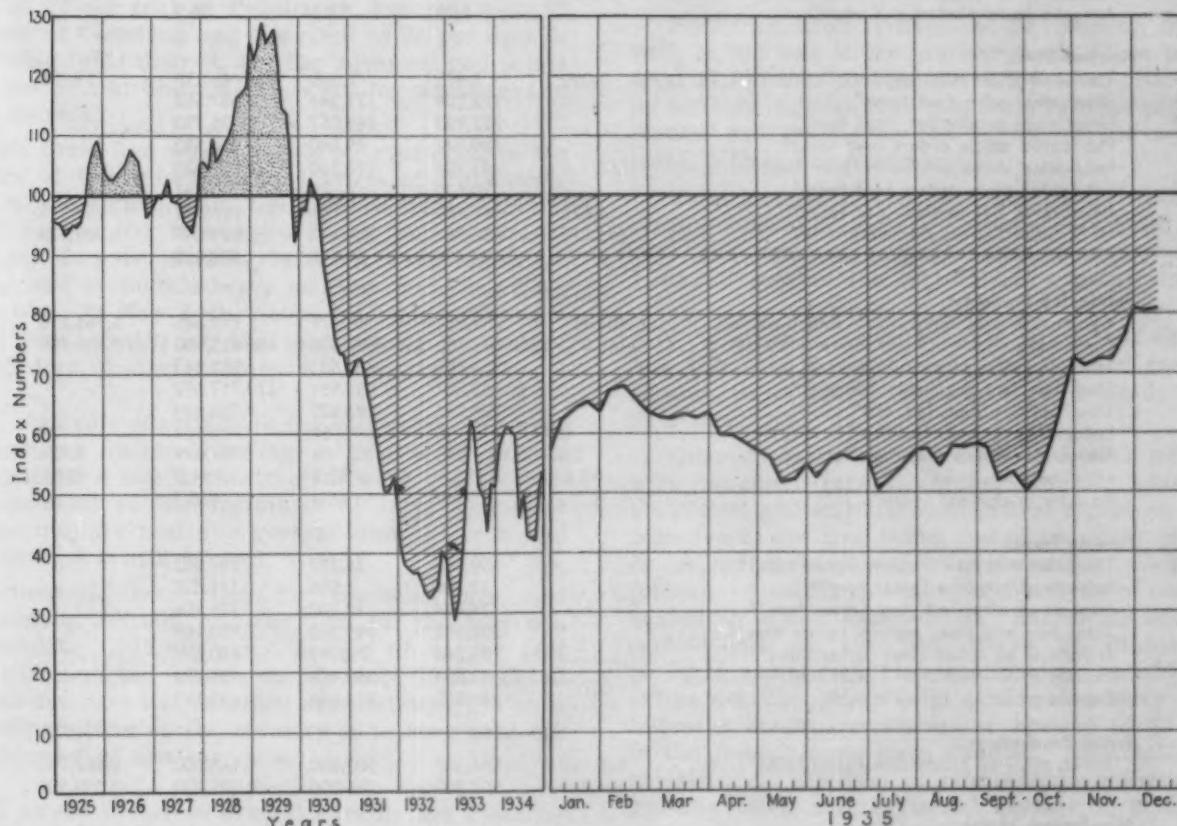
On the basis of the average rate prevailing from 1925 to 1927, THE IRON AGE cumulative index now stands at 30.6. This means that in

The Iron Age Weekly Index Numbers of Capital Goods Activity

(1925-27 = 100)

Last week (est.)	80.7
Preceding week (rev.)	80.4
Same week last month	72.3
Same week 1934	50.8
Same week 1933	53.7
Same week 1932	40.1
Same week 1931	52.0
Same week 1930	74.4
Same week 1929	99.2

50 weeks this year enough production has accumulated to be equivalent to 30½ weeks' production in terms of average weekly output during the base period. If conditions during that period can be called "normal," then production during 1935 so far has run 19½ weeks in arrears of normal output. Similarly, 1929 ran 10 weeks ahead of normal over the same period. Intervening years line up as follows: 1934, 26 weeks; 1933, 22½ weeks; 1932, 18½ weeks; 1931, 31½ weeks; 1930, 45 weeks.



(1925-27 Average = 100)

The Iron Age Index of Capital Goods Activity. The years 1925 to 1934 are plotted by months, the current year by weeks.

Components of the index: Steel ingot production rate, from THE IRON AGE; revenue freight carloadings of forest products, from Association of American Railroads; automobile production from Cram's Automotive Reports; heavy construction contract awards, from Engineering News Record; index of productive activity in Pittsburgh district, from Bureau of Business Research of University of Pittsburgh.

Current Metal Working Activity Statistically Shown

These Data Are Assembled by The Iron Age from Recognized Sources and Are Changed Regularly as More Recent Figures Are Made Available.

	November, 1935	October, 1935	November, 1934	Eleven Months, 1934	Eleven Months, 1935
Raw Materials:					
Lake ore consumption (gross tons) ^a	3,020,315	2,910,863	1,298,404	20,608,200	27,755,564
Coke production (net tons) ^b	3,136,351	2,358,300	26,931,000	.....	.....
Pig Iron:					
Pig iron output—monthly (gross tons) ^c	2,065,913	1,978,411	957,000	14,883,626	18,901,349
Pig iron output—daily (gross tons) ^c	68,864	63,820	31,898	44,583	56,591
Castings:					
Malleable castings—production (net tons) ^d.....	.....	43,467	28,515	336,712	.....
Malleable castings—orders (net tons) ^d.....	.....	45,246	28,530	317,641	.....
Steel castings—production (net tons) ^d.....	.....	.....	25,799	426,171	.....
Steel castings—orders (net tons) ^d.....	.....	.....	21,552	406,819	.....
Steel Ingots:					
Steel ingot production—monthly (gross tons) ^e ..	3,153,247	3,146,446	1,610,325	23,634,861	30,343,769
Steel ingot production—daily (gross tons) ^e	121,279	115,414	61,947	82,639	106,097
Steel ingot production—per cent of capacity ^e ..	54.78	52.13	28.13	37.3	47.9
Employment in Steel Industry:					
Total employees ^f.....	.....	436,554	381,663	411,440	.....
Total payrolls (thousands of dollars) ^f.....	.....	\$51,456	\$32,937	\$422,480	.....
Average hours worked per week ^f.....	.....	36.8	26.3	30.7	.....
Finished Steel:					
Trackwork shipments (net tons) ^g	3,090	3,495	2,065	46,838	39,204
Sheet steel sales (net tons) ^g.....	.....	226,209	133,344	1,637,552	.....
Sheet steel production (net tons) ^g.....	.....	222,963	143,057	1,735,720	.....
Fabricated shape orders (net tons) ^g.....	.....	100,841	89,340	986,583	.....
Fabricated shape shipments (net tons) ^g.....	.....	91,901	110,560	1,027,535	.....
Fabricated plate orders (net tons) ^g.....	.....	30,530	16,629	215,967	.....
Reinforcing bar awards (net tons) ^g	11,475	31,865	7,185	169,690	289,315
U. S. Steel Corp. shipments (tons) ^h	681,820	686,741	366,119	5,539,847	6,709,784
Ohio River steel shipments (net tons) ^h.....	.....	104,659	51,710	586,310	.....
Fabricated Products:					
Automobile production, U. S. and Canada ⁱ	406,486	283,334	85,179	2,713,645	3,756,276
Construction contracts, 37 Eastern States ⁱ	\$188,115,000	\$200,595,700	\$111,691,500	\$1,450,423,500	\$1,580,408,400
Steel barrel shipments (number) ^j.....	.....	884,688	466,933	6,258,167	.....
Steel furniture shipments (dollars) ^j.....	.....	\$1,562,303	\$1,038,951	\$10,717,672	.....
Steel boiler orders (sq. ft.) ^j.....	.....	784,341	286,622	4,108,688	.....
Locomotive orders (number) ^m	0	0	69	163	28
Freight car orders (number) ^m	25	810	4	23,079	8,128
Machine tool index ⁿ	98.6	102.9	52.4	†44.2	†93.8
Foundry equipment index ⁿ.....	.....	140.0	80.4	†60.7	.....
Foreign Trade:					
Total iron and steel imports (gross tons) ^p.....	.....	59,569	35,272	297,053	.....
Imports of pig iron (gross tons) ^p.....	.....	17,168	6,055	111,828	.....
Imports of all rolled steel (gross tons) ^p.....	.....	24,444	10,600	105,806	.....
Total iron and steel exports (gross tons) ^p.....	.....	238,358	299,263	2,550,109	.....
Exports of all rolled steel (gross tons) ^p.....	.....	81,248	78,797	870,676	.....
Exports of finished steel (gross tons) ^p.....	.....	63,954	60,402	755,422	.....
Exports of scrap (gross tons) ^p.....	.....	145,850	216,566	1,639,193	.....
British Production:					
British pig iron production (gross tons) ^r	525,100	544,300	507,600	5,465,000	5,862,700
British steel ingot production (gross tons) ^r	903,300	907,300	766,000	8,205,200	9,030,900
Non-Ferrous Metals:					
Lead production (net tons) ^s.....	.....	42,618	34,809	375,081	.....
Lead shipments (net tons) ^s.....	.....	42,271	31,762	345,127	.....
Zinc production (net tons) ^t	37,694	36,701	34,977	330,852	391,447
Zinc shipments (net tons) ^t	47,871	47,063	29,928	322,735	423,675
Deliveries of tin (gross tons) ^t	4,035	5,355	4,845	41,685	53,750

^tThree Months' Average.

Source of figures: ^a Lake Superior Iron Ore Association; ^b Bureau of Mines; ^c THE IRON AGE; ^d Bureau of the Census; ^e American Iron and Steel Institute; ^f National Association of Flat-Rolled Steel Manufacturers; ^g American Institute of Steel Construction; ^h United States Steel Corp.; ⁱ United States Engineer, Pittsburgh; ^j When preliminary, from Automobile Manufacturers Association—Final figures from Bureau of the Census; ^k F. W. Dodge Corp.; ^l Railway Age; ^m National Machine Tool Builders Association; ⁿ Foundry Equipment Manufacturers Association; ^o Department of Commerce; ^p British Iron and Steel Federation; ^q American Bureau of Metal Statistics; ^r American Zinc Institute, Inc.; ^s New York Commodities Exchange.

SUMMARY OF THIS WEEK'S BUSINESS

Seasonal Influences Depress Steel Production

Scrap Index Also Declines, But High Automobile Output and Rising Demand For Heavy Rolled Products Portend January Rebound

STEEL ingot production has receded one-half point to 55½ per cent in response to year-end influences and another decline is looked for next week, followed by a recovery in the new year. Though consumers generally are paring stocks in preparation for inventory taking, the cumulative effect on mill operations to date has been slight. Ingot output is off one point to 48 per cent at Pittsburgh, two points to 82 per cent at Cleveland and one point to 38 per cent in the Philadelphia district, but has advanced two points to 61 per cent at Chicago and is holding unchanged in other centers.

THE IRON AGE scrap composite, representing the average of heavy melting steel prices at Pittsburgh, Chicago and Philadelphia, has declined from \$13.42 to \$13.33 a gross ton, following a 25c. a ton recession at Chicago. In most markets, however, scrap prices are strong, and at Buffalo heavy melting grade has risen 50c. a ton. At New York, Italian interests have established bank credit for the purchase of upward of 100,000 tons of steel scrap on a cash basis.

THE high rate of activity in the automobile industry, expanding railroad buying, a revival of private shipbuilding, a rise in construction work and prospective increases in the operations of farm equipment makers indicate that the general trend of iron and steel demand is still upward.

Automobile assemblies for December are now estimated at 400,000, and the total for the year will approximate 4,135,000 units, a gain of 44 per cent over 1934 and the largest output since 1929. Retail demand for cars has exceeded expectations; the most pressing problem of the industry is to keep used car sales abreast of new car sales.

THE award of 10,000 freight cars by the Pennsylvania Railroad will mean wide distribution of the required 110,000 tons of steel among the mills in the territory served by that line. The Central of Georgia has bought 4500 tons of rails. The Santa Fe plans to build 550 freight cars and to purchase rails and track fastenings for 330 miles of track.

Close to 15,000 tons of hull steel will be required for the transatlantic vessel placed by the United States Lines with the Newport News Shipbuilding & Dry Dock Co. The Sun Shipbuilding & Dry Dock Co. is low bidder on two tankers, calling for 10,000 tons of plates, and several other tank vessels are pending.

Three ferryboats awarded by the city of New York involve 4500 tons of plates.

A total of 5800 tons, including structural shapes, plates, bearing piles, girder rails and reinforcing steel, has been placed for the Commonwealth pier, Boston. For flood control at Los Angeles the Government has awarded 14,537 tons of reinforcing bars.

Structural steel lettings, at 24,400 tons, compare with 18,000 tons in the previous week. New projects total 17,150 tons as against 19,350 tons. New work up for bids includes 8000 tons for a railroad passenger station and 4000 tons for an automobile assembly plant, both in Los Angeles.

Total awards of structural steel, plate work, reinforcing steel and piling reported in THE IRON AGE to date this year are 1,161,742 tons as compared with 1,105,923 tons in the corresponding period in 1934.

COAL prices have gathered strength, but Connells-ville coke has weakened, spot furnace grade declining 10c. to \$3.50 a ton, and foundry grade 25c. to \$4 a ton.

Quantity extras on wire nails and other merchant wire products, introduced last August, have been abandoned and existing base prices, except on woven wire fence, are now being quoted on either straight or mixed carloads, with preferentials allowed to jobbers. Quotations on wire fence have been advanced \$3 to \$61, base column. Extras for less-than-carload lots are 20c. per 100 lb. on all merchant products except bale ties and fencing, on which the extras are 25c. per 100 lb. Cold-rolled strip prices, following recent concessions of upward of \$3 a ton in the Detroit area, have steadied. Contracting for finished steel has been in good volume, reflecting the growing belief that a general advance in prices will eventually occur some time in the first quarter.

PIG iron shipments in the Great Lakes area are running close to 75 per cent ahead of November. Automotive foundries are melting metal as soon as it is received, but some of the iron moving to melters serving other industries is being added to stock piles. An additional blast furnace has been lighted at Ensley, Ala.

THE IRON AGE composite prices for pig iron and finished steel are unchanged at \$18.84 a gross ton and 2.130c. a lb., respectively.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous;
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	Dec. 17,	Dec. 10,	Nov. 19,	Dec. 18,
Per Gross Ton:	1935	1935	1935	1934
No. 2 fdy., Philadelphia	\$21.312	\$21.312	\$21.312	\$20.26
No. 2, Valley furnace	19.50	19.50	19.50	18.50
No. 2 Southern, Cin'ti	20.2007	20.2007	20.2007	19.13
No. 2, Birmingham	15.50	15.50	14.50	14.50
No. 2 foundry, Chicago*	19.50	19.50	19.50	18.50
Basic, del'd eastern Pa	20.8132	20.8132	20.8132	19.76
Basic, Valley furnace	19.00	19.00	19.00	18.00
Malleable, Chicago*	19.50	19.50	19.50	18.50
Malleable, Valley	19.50	19.50	19.50	18.50
L. S. charcoal, Chicago	25.2528	25.2528	25.2528	24.04
Ferromanganese, seab'd car-lots	85.00	85.00	85.00	85.00

[†]This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Finished Steel

	Dec. 17,	Dec. 10,	Nov. 19,	Dec. 18,
Per Lb.:	1935	1935	1935	1934
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.40	2.40	2.40	2.40
Hot-rolled annealed sheets, No. 24, Gary	2.50	2.50	2.50	2.50
Sheets, galv., No. 24, P'gh.	3.10	3.10	3.10	3.10
Sheets, galv., No. 24, Gary	3.20	3.20	3.20	3.20
Hot-rolled sheets, No. 10, P'gh	1.85	1.85	1.85	1.85
Hot-rolled sheets, No. 10, Gary	1.95	1.95	1.95	1.95
Wire nails, Pittsburgh	2.40	2.40	2.40	2.60
Wire nails, Chicago dist. mill	2.45	2.45	2.45	2.65
Plain wire, Pittsburgh	2.30	2.30	2.30	2.30
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.35
Barbed wire, galv., Pittsburgh	2.80	2.80	2.80	3.00
Barbed wire, galv., Chicago dist. mill	2.85	2.85	2.85	3.05
Tin plate, 100 lb. box, P'gh.	\$5.25	\$5.25	\$5.25	\$5.25

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2
Light rails, Pittsburgh	35.00	35.00	35.00	35.00
Rerolling billets, Pittsburgh	29.00	29.00	29.00	27.00
Sheet bars, Pittsburgh	30.00	30.00	30.00	28.00
Slabs, Pittsburgh	29.00	29.00	29.00	27.00
Forging billets, Pittsburgh	35.00	35.00	35.00	32.00
Wire rods, Pittsburgh	40.00	40.00	38.00	38.00
Cents	Cents	Cents	Cents	
Skelp, grvd. steel, P'gh, lb.	1.80	1.80	1.80	1.70

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.85	1.85	1.85	1.80
Bars, Chicago	1.90	1.90	1.90	1.85
Bars, Cleveland	1.90	1.90	1.90	1.85
Bars, New York	2.20	2.20	2.20	2.13
Plates, Pittsburgh	1.80	1.80	1.80	1.80
Plates, Chicago	1.85	1.85	1.85	1.85
Plates, New York	2.09	2.09	2.09	2.08
Structural shapes, Pittsburgh	1.80	1.80	1.80	1.80
Structural shapes, Chicago	1.85	1.85	1.85	1.85
Structural shapes, New York	2.06 1/4	2.06 1/4	2.06 1/4	2.05 1/4
Cold-finished bars, Pittsburgh	1.95	1.95	1.95	2.10
Hot-rolled strips, Pittsburgh	1.85	1.85	1.85	1.85
Cold-rolled strips, Pittsburgh	2.60	2.60	2.60	2.60

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	\$3.50	\$3.60	\$3.60	\$3.85
Foundry coke, prompt	4.00	4.25	4.25	4.60

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery	9.00	9.00	9.00	8.75
Lake copper, New York	9.37 1/2	9.37 1/2	9.37 1/2	9.12 1/2
Tin (Straits), New York	49.87 1/2	50.25	51.50	50.95
Zinc, East St. Louis	4.85	4.85	4.85	3.75
Zinc, New York	5.22 1/2	5.22 1/2	5.22 1/2	4.10
Lead, St. Louis	4.35	4.35	4.35	3.55
Lead, New York	4.50	4.50	4.50	3.70
Antimony (Asiatic), N. Y.	14.50	14.75	15.50	13.75

The Iron Age Composite Prices

Finished Steel

Dec. 17, 1935	2.130c. a Lb.
One week ago	2.130c.
One month ago	2.130c.
One year ago	2.124c.

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products represent 85 per cent of the United States output.

Pig Iron

\$18.84 a Gross Ton
18.84
18.84
17.90

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap

\$13.33 a Gross Ton
13.42
13.00
11.58

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

HIGH	LOW	HIGH	LOW	HIGH	LOW
2.130c., Oct. 1	2.124c., Jan. 8	\$18.84, Nov. 5	\$17.83, May 14	\$13.42, Dec. 10	\$10.33, April 23
2.199c., April 24	2.008c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 18	9.50, Sept. 25
2.015c., Oct. 3	1.867c., April 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
2.286c., Dec. 11	2.217c., July 17	18.58, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Pittsburgh Operations Dip To 43 Per Cent



But Valley and Wheeling District Rates Hold Unchanged—Method of Quoting Wire Products Revised

PITTSBURGH, Dec. 17.—Sustained finishing mill schedules in the current week will offset any marked revisions in open-hearth production at least until the Christmas holiday. Some mills in the Pittsburgh district have built up moderate stocks of ingots and semi-finished steel, but such inventories would not carry finishing mills for any extended period at their present gaits. Consequently ingot output here is off only one point this week to 43 per cent of capacity. Steady demand for flat-rolled steel is supporting an unchanged rate of 62 per cent in the Valleys and nearby northern Ohio mills, while a similar condition exists in the Wheeling district, which is unchanged at 78 per cent.

An unusually heavy tin plate output, estimated at 80 per cent of capacity, is playing no little part in forestalling the customary year-end recession in steel activity. A continued strong anticipatory movement of semi-finished steel to non-integrated mills is another important factor. Structural steel mills are in the midst of a seasonal lull. Pipe mill schedules are moderately heavier than they were in the first half of November.

Sheet and strip prices have steadied since the recent unsettlement in the Detroit district. Wire producers have forsaken the recently adopted set-up of extras and are now quoting base prices on straight or mixed carloads, with new extras for less than carloads on all merchant wire products excepting bale ties and fencing.

The Pennsylvania Railroad car-building program probably will not benefit Pittsburgh steel makers until some time in the first quarter. Prospective demand for railroad steel, particularly small shapes and plates for car building, is considered unusually promising. Shipments of automobile steel out of

the Pittsburgh district are slowing up moderately.

Pig Iron

Shipments against fourth quarter contracts are being ordered out in steady volume. Early abatement of the present movement seems unlikely because most consumers will wish all low-priced tonnage shipped by the year-end. In some instances, shipments may extend into January, but any new business placed after the turn of the year will be booked at the new quotations. Despite full-time melting schedules at mill equipment plants here, pig iron requirements of these units still are being covered entirely by reciprocal arrangements. The placing of large car orders in this district by the Pennsylvania Railroad presages a substantial demand for pig iron probably some time in first quarter. Quotations are firm.

Semi-Finished Steel

The high rate of tin plate production at some non-integrated plants is stimulating a sustained flow of sheet bars against fourth quarter contracts booked at \$28, Pittsburgh. In the face of heavy operations, the building up of inventories of low-priced material in anticipation of general application of the \$2 a ton advance in November has been difficult. Pressure for reinstatement of early fourth quarter quotations on semi-finished steel thus far has failed to elicit any suggestion from producers of abandoning the \$2 a ton advance.

Bolts, Nuts and Rivets

Since the recent price increase on small and large bolts, specifications on fourth quarter contracts have expanded moderately. A final spurt of releases is expected before the close of the year. Automotive demand is fair, while demand for the Pennsylvania Railroad car-building program may reach as high as 10,000 tons when shops initiate this work. General prospects

for railroad demand are the brightest in several years.

Bars

A further slight decrease in general demand is noticeable, but most mills will be substantially engaged until the end of the month. What little decline is in progress is traceable to a variety of consuming sources, with the automobile industry momentarily an exception.

Rails and Track Accessories

Inquiry has become rather limited since the recent flurry of rail and accessory buying. A fair amount of track spike business is being booked in anticipation of the \$4 a ton advance for first quarter. The local rail mill this week will be scheduled at about 50 per cent, part of which will be on sheet bars.

Reinforcing Steel

The 15,000 tons for the flood prevention project in California, on which the California Hardware Co., Los Angeles, is low bidder, probably will be divided among several Pacific Coast producers. Reinforcing steel specifications are largely for specific jobs, while those from distributors are seasonally lighter. Except where definite projects are in progress or planned, first quarter contracting has been negligible. Mill base prices are firm. Distributors' quotations also are stiffening but have not thrown off entirely the weakness of the past two months.

Sheet Steel Piling

Award of 3700 tons for waterfront improvements at Miami, Fla., probably will be made within the next fortnight, pending settlement of red tape by local municipal bodies. The general piling market is entering the usual seasonal lull, and prospects for marked expansion in demand before well into first quarter are unfavorable. About 3200 tons for the Imperial dam near Yuma, Ariz., now is expected to be purchased by the Bureau of Reclamation after Jan. 1.

Cold-Finished Bars

Shipments in the first half of December are running moderately ahead of those for the like period in November. The chances for a sustained movement through the remainder of December are fair, based partly on the expectation that jobbers probably will increase specifications in anticipation of the \$3 a ton advance in the base price. Specifications are being accepted until Dec. 31 for shipment through January at present prices. Spot business after Jan. 1 will be billed at the new price. Automobile de-

mand, while steady, is in relatively small volume, while business from miscellaneous sources accounts for the bulk of incoming releases.

Plates and Shapes

The placing with car builders in this district of a substantial share of the Pennsylvania Railroad's orders for 10,000 new freight cars will result in a relatively heavy demand for plates and small structural shapes, probably in the first quarter. Added to this prospect is a tentative interest in wide-scale barge building, which, however, hinges largely on financial arrangements.

Featuring fresh structural inquiries is one for 4000 tons for a Chevrolet Motor Co. assembly plant at Los Angeles. Structural awards, while numerous, still are lacking in individual important tonnage. State highway bridge construction predominates, with private work negligible.

Tubular Goods

The small improvement that began in the first week of September is sustained. Oil country business is largely responsible for the increased tonnage. Inquiry for mechanical tubing is a little more active. Substantial business is in the offing for welded pipe for air brakes when the Pennsylvania Railroad car-building program gets under way. The year is closing with few specific line projects of importance in the wind.

Wire Products

Producers in this district now are quoting base prices on straight carloads or mixed carloads, with extras for less than carloads of 20c. per 100 lb., on all merchant wire products, excepting bale ties and fencing, on which the extras are 25c. per 100 lb. Woven wire

fence has been advanced \$3 to \$61, base column. It is understood that a deduction of \$2 a ton on merchant wire is allowable to jobbers. Little change in trend of demand can be detected. Wire mill schedules in this district are fairly well maintained at 40 to 45 per cent of capacity.

Sheets

The volume of sheet orders in the past week was the same as that in the preceding period, which, however, represented a let-down from the record week reported after mid-November. The current operating rate for the sheet industry of 75 per cent has not suffered, most sheet producers being well committed for the next four weeks. Orders are mostly of the rush variety, indicating small stocks in the hands of consumers, and it is considered unlikely that any extended interruption in rolling schedules will take place during Christmas week. About 20,000 to 25,000 tons of sheets is the estimated requirement for the Pennsylvania Railroad car-building program, which will get under way probably in first quarter.

Tin Plate

Although no new sources of specifications are reported, the tin plate industry this week will maintain its recent operating rate of 80 per cent. Rolling against next year's contracts is quite heavy, but some producers report a small decrease in stocks in mill hands.

Strip Steel

Prices have assumed a firmer tone since the recent sharp competition, which led to concessions of \$3 a ton in the Detroit district. Demand is regarded as being quite encouraging for this time of the year, no noticeable setbacks being registered in either automobile or

miscellaneous business. The prospects for a severe let-down in mill operations before the year-end are considered slight, since most mills are booked quite heavily on some items for three to six weeks ahead. Hot and cold-rolled strip production is averaging 60 per cent of capacity.

Coal and Coke

Demand for domestic coal and coke is fairly strong, and prices for these grades have accordingly gathered strength. On furnace and foundry coke, the reverse is true; these grades, while moving in heavier volume, are now readily purchaseable at 10c. to 25c. a ton lower. Spot furnace coke is quotable at a minimum of \$3.50, and spot foundry at \$4, net ton, Connellsville ovens. Industrial bituminous coal prices also are soft, with most grades off 10c. to 25c. a ton.

Scrap

The first signs of a year-end lull have appeared. Little, if any, consumer buying of importance is looked for during the remainder of December, and some brokers, believing that the short seasonal slump will possibly thaw out some of the frozen scrap supplies, are reducing offering prices for No. 1 heavy melting steel. The leading mill, which purchased about 20,000 tons of No. 1 steel at \$13.75 some weeks ago, is not pressing for deliveries, but, nevertheless, brokers are not finding it easy to avoid losses in covering against the order. No. 1 steel offering prices today range from \$13.85 to \$14. Other grades are quiet. Regarded as a whole, the scrap market does not appear to be on the verge of a marked slump, but points rather to sustained firmness, provided steel ingot output in this district remains steady after the turn of the year.

Weekly Indications of Steel Activity

From THE IRON AGE

	Dec. 17, 1935	Dec. 10, 1935	Nov. 19, 1935	Dec. 18, 1934	Average 1935	1934
Steel ingot operations—Per cent of capacity	55.5	56.0	54.5	35.5	48.0	37.1
	Dec. 17, 1935	Dec. 10, 1935	Nov. 19, 1935	Dec. 18, 1934	Year to Date 1935	1934
Fabricated structural steel awards	24,400	18,000	11,250	10,650	725,960	737,155
Fabricated plate awards	24,015	2,720	4,665	600	62,297	115,467
Sheet steel piling awards	2,500	0	300	100	63,320	73,710
Reinforcing bar awards	15,700	4,000	1,315	1,600	310,165	179,591

Chicago Output Up Two Points to 61 Per Cent



Railroad Buying Looms As Prospective Source of Large Tonnages—Scrap Prices in General Recession

CHICAGO, Dec. 17.—Current sales are the best for any week in several years. One influence is the addition to mill books of the Union Pacific rails and fastenings, but new bar tonnages and increased structural items are also important factors. Fresh specifications are among the highest of the year and ingot output has moved up correspondingly to 61 per cent of capacity, a gain of two points from a week ago. Plans which have been altered many times call for extensive mill repair work, which will probably be started Christmas week, when ingot output is expected to drop sharply.

One of the most gratifying features of the market is the support that is already coming from the railroads. The Pennsylvania car program is under way, and the Santa Fe is providing in its budget for 570 new cars and repairs to old equipment. The Illinois Central is ordering out materials for its repair and rebuilding work, and the St. Louis-San Francisco contemplates buying 2000 new cars. The Milwaukee road's shops are at normal operations and other railroad shops are using more materials.

News regarding prices centers around a flurry, which is now past, in quotations for cold-rolled strips, and the announcement that wire mills are reverting to quoting base prices to the trade with jobber differentials allowed. The scrap market also enters the news columns with a 25c. reduction on steel mill grades and sympathetic softening of other items.

Pig Iron

Specifications are heavy and there is every indication that most old contracts will be taken out before the end of the year. At present, the melt is steady, but those foundries that are in position to do so will take a liberal holiday period. There are still some first quarter contracts being placed, but the total volume of bookings for the first three months of the new year is not large. It is estimated

that the carryover into the new year will not much more than suffice for the month of January.

Cast Iron Pipe

Requests for bids still swamp contractors and pipe sellers, and the latter now expect sizable backlog to be carried forward into January. The usual red tape is holding back the actual placing of orders, and many jobs will be started far later than planned. Milwaukee has taken bids on a miscellaneous lot of castings for its new filtration plant. Price structures remain firm, with no indication that they will move one way or the other.

Reinforcing Bars

The flood of small projects is still at hand, and it looks as though it will not be stemmed before the end of the month. In some cases, where bids are overrunning estimates, the jobs are being pared so that they will fit the money allotted and construction can start. Large awards are scarce, but a number of sizable projects are before the trade and many of these will drop before the end of the month. The State of Illinois has ordered bars for a 400-ton bridge and orders have been placed for a 325-ton State hospital. A new armory for Rock Island, Ill., will take 338 tons. Prices are now undergoing tests, and they lean toward the weak side.

Wire Products

Producers are reverting to the practice abandoned last August and on all merchant products are again quoting prices to the trade, either in straight or mixed car-loads, with differentials allowed to jobbers. All prices remain the same as now quoted with the exception of woven wire fencing, which is being raised \$3 to \$61, base column, in order to conform to the new practice. The past week witnessed an increase in incoming orders, and therefore part of the loss registered near the opening of the month has been regained.

Consumption in the manufacturing lines remains heavy, and most specifications are for prompt shipment. Output is close to 60 per cent of capacity.

Cold-Rolled Strip

The flurry of cut prices, which averaged about \$3 a ton below current quotations, has passed and once again price levels are stable. Releases are holding mills near capacity operations.

Rails

The Union Pacific rails and fastenings are now reaching producers' books and releases are expected for some of the tonnage, which will be taken late in January. The Santa Fe's budget calls for rails and fastenings for 330 miles of track. Price information has been given to several Western railroads, but they have not as yet issued formal inquiries. Rail mills are producing at 25 per cent of capacity and are scheduled to about the middle of January. Accessory departments remain at capacity.

Sheets

There is further indication that the miscellaneous trade is in need of smaller tonnages, but the change from week to week is very slight. In general, deliveries of sheet mill products average about 30 days. The galvanized product is comparatively slow, but a turn for the better is expected before the end of January. The sheet business in the Southwest is badly demoralized and some sales offices are being closed.

Bars

The bar picture is reversed, with specifications higher both from automobile plants and the miscellaneous trade. Farm implement manufacturers remain busy and now have outlined production schedules for the early part of next year. They are expected to increase their steel consumption in the coming months. In some areas forgers and spring makers are having trouble in meeting demands.

Structural Material

Specifications remain steady and shops are gaining in activity. Listed awards are unimpressive, but a great number of small lettings account for over 2000 tons. Likewise small miscellaneous inquiries promise close to 7000 tons to mills.

Plates

Only 400 cars will be built for the Pennsylvania in this district, but it is probable that miscellane-

ous parts for other cars will be made in this area. The Santa Fe contemplates building 500 box cars and 50 hopper cars, and it also has in mind an extensive repair program. The Milwaukee Road's shops are back on a normal schedule, and the Illinois Central is taking material for its large rebuilding program. The St. Louis-San Francisco contemplates the purchase of 2000 cars. Plate orders for tanks total about 700 tons.

Scrap

A mill has taken a round tonnage of heavy melting steel at \$13.50 a ton and the market as a whole is softer. Dealers have lowered bids for heavy melting steel to a range from \$13 to \$13.25. Consumption remains at a high level, but supplies are ample and the trade looks for a quiet market during the remainder of the year, with more active trading early in January.

Scrap Stronger At Buffalo

BUFFALO, Dec. 17.—Interest in this district centers in an unexpected demand for scrap, a development of the past few days. Dealers are accustomed to expect a lull during this season of the year, and, while the market has been very strong the past few weeks and buying early in January was clearly indicated, the dealers were hardly prepared for heavy demand at this time.

Two of the mills have been interested in buying during the past week, and the reasons are patent. One mill has been operating five open-hearths, its maximum operation of the year, at a steady pace for the past two or three weeks, and heavy quantities of scrap have been consumed. With a fairly steady rolling schedule in prospect, purchasing of scrap has been imperative. This mill is believed to have purchased at least 5000 tons of No. 2 steel during the past few days, though this report cannot be officially confirmed. The prices paid are reported to have been \$11.25 and \$11.50.

Bethlehem's new sheet and strip mill is expected to start shortly after Christmas, with one unit possibly going in before that time. While not official, it is probable that Bethlehem's open-hearth operations will be augmented considerably when the new mill starts. At the present time, the Lackawanna plant is operating 12 open-hearths.

Extensive buying of boat scrap has been going on until recently, but, with expanded operations, the trade believes more extensive purchasing is in prospect. This mill has already raised its offering price to \$12 for No. 1 heavy melting steel, which means a \$1.50 differential for No. 2 steel.

While the scrap market has been humming, the pig iron market is without important change.

Commitments in structural steel and reinforcing bars have been unimpressive. There has been a steady flow of less than 100-ton lots, but the larger contracts are, in the main, awaiting PWA approval.

Boston Export Scrap Prices Strong

BOSTON, Dec. 17.—The reported advance in Pittsburgh No. 1 heavy melting steel to \$14 to \$14.50 a ton, delivered, has not been reflected here. Only small tonnages left New England the past week for Pittsburgh, for which \$13.50 to \$14 a ton delivered was paid, mostly \$13.50 to \$13.75. On the other hand export scrap prices are strong, with stove plate, rails and steel turnings averaging 25c a ton higher. For scrap rails the top is \$10 a ton, delivered Army base, for stove plate \$7, and for turnings \$5.50. Small tonnages of No. 2 cast bring \$7.75 a ton Army base, and large tonnages \$8. No. 2 heavy melting steel is very active at \$8.75 a ton, and round tonnages of No. 1 are loading here at \$9.75 a ton, Army base. Exports the past week totaled 8500 tons, 7000 tons to Japan and the balance to Scotland. Current loadings total 9500 tons.

Little new pig iron business is being closed, but deliveries on old contracts are moving well. The past week 800 tons of Indian iron landed here, all previously sold. Another consignment is due today and it is sold, and a third consignment is due Dec. 29, most of which is sold. Dutch iron is offered in a small way at prices about \$1 a ton under domestic quotations, and a little Russian iron is hanging over the market at \$2 a ton less than domestic.

Reinforcing steel distributors and structural steel fabricators are very busy figuring jobs, but actual closings are slow.

Warehouse sales hold up well, with prices unchanged. A change in prices for cold-rolled products is expected around Jan. 1.

Pipe Lines

Houston Natural Gas Co., Houston, Tex., plans steel pipe lines for natural gas distribution at Port Lavaca, Tex., where franchise recently was granted. Will construct main welded steel pipe line to town limits for bulk supply. Frank C. Smith is general manager.

Middlesex Pipe Line Co., a subsidiary of Sun Oil Co., Philadelphia, plans steel pipe lines in several streets in Newark, N. J., for connection with main trunk line near Trenton, N. J., for gasoline supply for terminal plant on Passaic River, Newark.

Morley Natural Gas Co., Morley, Mich., recently organized, plans steel pipe lines for natural gas distribution at Morley and vicinity. Aetna Pipeline Co., Morley, an affiliated interest lately incorporated, plans welded steel pipe line from natural gas fields in Winfield and Aetna townships, Mecosta County, for bulk supply for Morley Company.

Stanolind Pipe Line Co., Tulsa, Okla., plans new 6-in. welded steel pipe line from oil field district at Pitts, Pontotoc County, Okla., to Maud, Okla., for crude oil transmission. Cost over \$175,000.

Municipal Utility District, Indianapolis, plans steel pipe lines to form belt system in new industrial districts of city, and for replacements in number of existing lines. Fund of \$750,000 has been secured through Federal aid. Plans also are maturing for new steel pipe lines for natural gas supply for city.

Tri-States Natural Gas Corp. of South River, N. J., Frank J. Prentice, 106 Main Street, South River, president, is considering steel pipe lines for natural gas supply in this district. Company is arranging financing to total about \$220,000 for project.

Industrial Fuel Supply Co., 810 South Flower Street, Los Angeles, has approved plans for new welded steel pipe line in Mountain View natural gas field, Kern County, for connection with present line, about 22 miles. Installation will be under direction of Macco-Robertson, Ltd., Paramount Boulevard, Clearwater, Cal. Cost about \$200,000.

L. R. Flori Co., St. Louis, has been awarded contract for 738 miles of 1-in. steel pipe, totaling 1500 tons, for artificially cooling the concrete in Grand Coulee Dam, Ore. An identical bid was made by Laclede Tube Co. and decision for the contract was made by lot.

Chandler Heights Citrus Irrigation District has opened bids at Higley, Ariz., on about 1900 tons of 12 to 16-in. steel pipe.

Detroit Scrap Market is Firm

DETROIT, Dec. 17.—The local scrap market continues to show strength. Although prices have not changed in the past week, further advances are expected in the immediate future. One or two more boatloads of scrap are yet to be shipped to lower Lake ports before water transportation is suspended for the winter. It is roughly estimated that shipments by water this year have been at least double those of 1934.

Cleveland Rate Recedes To 82 Per Cent



Business Volume Remains Large,
But Demand for Sheets and Strips
Has Eased Off—Scrap Is Strong

CLEVELAND, Dec. 17.—The volume of business in finished steel is well sustained, although there has been some decline in the demand for sheets and strip steel and to a less extent for bars from consumers who started to stock up in anticipation of a price advance. Deliveries on some of this business have been extended and spread out over the first quarter. Ingot output in the Cleveland-Lorain district declined two points this week to 82 per cent of capacity, the Republic Steel Corp., which operated all of its 14 local open-hearth furnaces last week having taken off one open-hearth.

New tonnage continues to come from the motor car industry, but not in such large lots as last month. Orders from this source are confined to January production requirements. Heavy specifications are being placed against contracts for billets and wire rods, and some consumers will accumulate sizable stocks before the higher prices become effective Jan. 1. Specifications against expiring pig iron contracts are also very heavy. Miscellaneous business in finished steel continues good.

Activities with many consumers are being stimulated by the demand for equipment for WPA work. These include manufacturers of shovels, road scrapers and other tools. Manufacturers of metal wheels have become quite busy and are ordering steel more freely than for a long time. In the construction field, public work continues to come out but there is little private work. Numerous grade crossing elimination projects in Ohio are still awaiting completion of plans and it is doubtful whether any of these will come out before January.

Pig Iron

Sales for the first quarter continue fairly heavy in lots of up to 1000 tons, most of the business coming from automobile plants and other foundries doing automotive work. Shipments against contracts placed at the old price are running close to 75 per cent ahead of November. Much of the iron that is

being shipped, outside of that going to the automotive field, is being placed in foundry stock piles for consumption during the early weeks of next year.

Sheets

New demand from the motor car industry has declined moderately. Orders from that source are not in such large lots as recently. While some consumers, including local stamping plants making automobile parts, are crowding the mills for shipments, others are showing less anxiety for deliveries and this has resulted in an easing up of the pressure on producers. Mills have a good volume of business on their books for January shipment and can take orders only for hot-rolled material for early delivery. Demand for enameling sheets is fairly heavy. Orders from refrigerator manufacturers have improved, and some of these manufacturers are planning heavier production schedules for 1936 than

during the current year. Demand is well sustained from makers of stoves and washing machine tubs.

Strip Steel

While new demand is not so active as a few weeks ago, mills have a good volume of business on their books. Some of the parts units of automobile companies have issued releases for January shipment. Good orders for hot strip are coming from non-integrated plants making cold-rolled material.

Bars, Plates and Shapes

Demand for steel bars is holding close to recent volume. Forge shops and other makers of automotive parts continue to order freely. Business from agricultural implement and road scraper manufacturers is fair in both bars and light plates. Structural inquiry is light. For school houses in Cleveland and Toledo 1500 tons of structural shapes will be awarded shortly. A filtration plant in Cincinnati will take 505 tons. New public works inquiries include sewage treatment works in Mansfield and Massillon requiring 600 tons of reinforcing bars.

Iron Ore

Lake ore consumed in November amounted to 3,020,315 tons, a gain of 109,452 tons over October. This compares with 1,298,404 tons in November last year. Stocks at furnaces Dec. 1 totaled 28,963,703 tons. Furnace and dock stocks were 34,276,968 tons, a decrease

QUICKER-CLEARER NUMBERING

for all kinds of metal numbered work,
with these remarkable new machines

SPEED-SET NAME-PLATE AND METAL NUMBERING MACHINES

Carriage table advances one space with each impression of the dial, like a typewriter, giving rapid work, even spacing and perfect alignment.



Model P-4
Mono-Wheel

*Write for new catalog of special machines for
all kinds of metal numbering.*

AMERICAN NUMBERING MACHINE CO.

224 Shepherd Ave., BROOKLYN, N. Y.

of over 1,500,000 tons as compared with Dec. 1 last year, when the amount on hand was 35,840,681 tons. There were 103 furnaces in blast using lake ore on Dec. 1, a gain of one for the month.

Ore receipts at Lake Erie ports this season were 19,889,804 tons, a gain of 4,317,281 tons over last year. Shipments from these ports during the season were 14,012,447 tons, a gain of 2,913,679 tons over the same period last year. Receipts at other than Lake Erie ports this season were 8,154,055 tons, a gain of 1,706,971 tons over 1934. Ore on Lake Erie docks Dec. 1 amounted to 5,313,265 tons, an increase of 64,710 tons over the

dock balance on the same date a year ago.

Scrap

The market is inactive but very firm. The supply of steel-making scrap, particularly heavy melting steel, is not plentiful at present quotations and dealers are having difficulty in obtaining scrap to fill outstanding orders. Unless the market softens, steel plants probably will have to pay more for scrap when they again come in the market than they did when they made their last purchases. Blast furnace grades have moved up 25c. a ton, and flashings and No. 1 busheling are higher.

furnish 845 tons for a bridge in Burnet County, Tex., and 380 tons for a bridge over the Sabine river, also in Texas.

Twelve open-hearts were operated last week, a decrease of one as compared with the preceding week. This week 12 will also be operated.

Large Lettings on Coast

SAN FRANCISCO, Dec. 16.—With bids being opened on a score or more of State grade crossings the reinforcing steel distributors and structural steel fabricators have been working at a fast pace. A great number of general contract lettings are expected within the next few days.

Bids have been opened on approximately 1900 tons of steel pipe for the Chandler Heights Citrus Irrigation District at Higley, Ariz. Recent estimates on 16.47-mile unit of the Colorado River aqueduct, on which bids are to be opened at Los Angeles on Jan. 7, call for approximately 44,000 tons of plates if all steel alternates are accepted.

The United States Engineer's Office at Los Angeles has awarded 14,537 tons of reinforcing bars for flood control work to the Los Angeles Iron & Steel Co. The award of 14,200 tons of reinforcing bars on the Colorado River aqueduct is yet pending. Long Beach, Cal., has placed tanks, calling for 1200 tons of plates, with the Western Pipe & Steel Corp. Reinforcing bookings that will probably be made within the next two weeks will undoubtedly boost the year's total to a figure that will be double of that for 1934. Structural bookings will be about even, while plate and cast-iron pipe aggregates will probably show a slight loss.

Pig Iron Output Rises in South

BIRMINGHAM, Dec. 17.—Pig iron production was further increased last week when the Tennessee Coal, Iron & Railroad Co. blew in Ensley No. 6 on Dec. 10, raising the company's total of active furnaces to five and the district total to 12. Not since June, 1931, have that many been in production. On last Saturday, the Tennessee company changed Ensley No. 5 from basic iron to ferromanganese. At an early date two other changes are to be made, when one furnace will switch from foundry to basic and another from foundry to recarburizing iron.

The Tennessee company is operating five blast furnaces; Woodward Iron Co., three; Sloss-Sheffield Steel & Iron Co., two, and Republic Steel Corp., two.

Current pig iron bookings are still light on account of previous buying for the quarter, but shipments are heavy this month as

foundries are calling for deliveries on \$14.50 contracts. The present base price, both for spot and contract iron, is \$15.50.

Wire products and sheets continue fairly active, and demand is holding at a steady rate. Prices are now firmer. Last week some track accessory business was placed and announcement was made of an order for 4500 tons of 90-lb. rails from the Central of Georgia railroad, which had been placed several weeks previously. Other rail orders are pending and should be placed in the next week or so. It now looks as if the Ensley rail mill is assured of steady operations through the first quarter.

A number of structural orders have been booked by the fabricators. Ingalls Iron Works was awarded 1200 tons for the enlargement of Lock 17 on the Warrior River and 120 tons for improvements at the Atlantic Steel Co., Atlanta. Nashville Bridge Co. has an order of 185 tons for a grade separation project in the district. Virginia Bridge & Iron Co. will



THE part that steel is beginning to play in Christmas shopping programs is shown in this photograph of the various forms of tableware which are now made of stainless steel. These products are all made of Enduro metal made by the Republic Steel Corp., Massillon, Ohio.

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars

	Soft Steel	Base per Lb.
F.o.b. Pittsburgh	1.85c	
F.o.b. Chicago	1.90c	
F.o.b. Gary	1.90c	
F.o.b. Duluth	2.00c	
Del'd Detroit	2.00c	
F.o.b. Cleveland	1.90c	
F.o.b. Buffalo	1.95c	
Del'd Philadelphia	2.10c	
Del'd New York	2.20c	
F.o.b. Birmingham	2.00c	
F.o.b. cars dock Gulf ports	2.25c	
F.o.b. cars dock Pacific ports	2.40c	

Rail Steel

(For merchant trade)	
F.o.b. Pittsburgh	1.70c
F.o.b. Chicago	1.75c
F.o.b. Gary	1.75c
F.o.b. Moline, Ill.	1.75c
F.o.b. Cleveland	1.75c
F.o.b. Buffalo	1.80c
F.o.b. Birmingham	1.85c
F.o.b. cars dock Gulf ports	2.10c
F.o.b. cars dock Pacific ports	2.25c

Billet Steel Reinforcing

(Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	2.05c
F.o.b. Chicago	2.10c
F.o.b. Gary	2.10c
Del'd Detroit	2.20c
F.o.b. Cleveland	2.10c
F.o.b. Youngstown	2.10c
F.o.b. Buffalo	2.10c
F.o.b. Birmingham	2.10c
F.o.b. cars dock Gulf ports	2.45c
F.o.b. cars dock Pacific ports	2.45c

Rail Steel Reinforcing

(Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	1.90c
F.o.b. Chicago	1.95c
F.o.b. Gary	1.95c
Del'd Detroit	2.20c
F.o.b. Cleveland	2.10c
F.o.b. Youngstown	2.10c
F.o.b. Buffalo	2.10c
F.o.b. Birmingham	2.10c
F.o.b. cars dock Gulf ports	2.30c
F.o.b. cars dock Pacific ports	2.30c

Iron

	Base per Lb.
F.o.b. Chicago	1.80c
F.o.b. Terre Haute, Ind.	1.75c
F.o.b. Louisville, Ky.	2.10c
F.o.b. Danville, Pa.	1.80c
F.o.b. Berwick, Pa.	1.70c

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	1.95c
F.o.b. Chicago	2.00c
F.o.b. Gary	2.00c
F.o.b. Cleveland	2.00c
F.o.b. Buffalo	2.05c
Del'd Detroit	2.15c
Del'd eastern Michigan	2.20c

* In quantities of 10,000 to 19,000 lb.

Fence and Sign Posts

	Angle Line Posts	Base per Net Ton
F.o.b. Pittsburgh		\$54.00
F.o.b. Chicago		54.00
F.o.b. Duluth		55.00
F.o.b. Cleveland		54.00
F.o.b. Birmingham		57.00
F.o.b. Houston, Orange, Beaumont, Galveston		63.00
F.o.b. Mobile		62.00
F.o.b. New Orleans, Lake Charles, Corpus Christi		63.00
F.o.b. cars dock Pacific ports		67.00

Plates

	Base per Lb.
F.o.b. Pittsburgh	1.80c
F.o.b. Chicago	1.85c
F.o.b. Gary	1.85c
Del'd Cleveland	1.90c
F.o.b. Coatesville	1.90c
F.o.b. Sparrows Point	1.90c
Del'd Philadelphia	1.90c
Del'd New York	2.00c
F.o.b. Birmingham	1.90c
F.o.b. cars dock Gulf ports	2.20c
F.o.b. cars dock Pacific ports	2.35c
Wrought iron plates, f.o.b. Pgh.	3.20c

Floor Plates

	Base per Lb.
F.o.b. Pittsburgh	3.35c
F.o.b. Chicago	3.40c
F.o.b. Coatesville	3.45c
F.o.b. cars dock Gulf ports	3.75c
F.o.b. cars dock Pacific ports	3.90c

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	1.80c
F.o.b. Chicago	1.85c
F.o.b. Gary	1.85c
Del'd Cleveland	1.90c
F.o.b. Buffalo	1.90c
F.o.b. Bethlehem	1.90c
Del'd Philadelphia	2.015c
F.o.b. New York	2.022c
F.o.b. Birmingham (standard)	1.95c
F.o.b. cars dock Gulf ports	2.20c
F.o.b. cars dock Pacific ports	2.35c

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.15c
F.o.b. Chicago	2.25c
F.o.b. Gary	2.25c
F.o.b. Duluth	2.25c
Del'd Detroit	2.25c
F.o.b. Cleveland	1.90c
F.o.b. Buffalo	1.95c
Del'd Philadelphia	2.10c
Del'd New York	2.20c
F.o.b. Birmingham	2.00c
F.o.b. cars dock Gulf ports	2.25c
F.o.b. cars dock Pacific ports	2.60c

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.85c
No. 10, f.o.b. Gary	1.95c
No. 10, del'd Detroit	2.05c
No. 10, f.o.b. Birmingham	2.00c
No. 10, f.o.b. cars dock Pacific ports	2.40c

Hot-Rolled Annealed

	Base per Lb.
No. 24, f.o.b. Pittsburgh	2.40c
No. 24, f.o.b. Gary	2.50c
No. 24, del'd Detroit	2.60c
No. 24, f.o.b. Birmingham	2.71c
No. 24, f.o.b. cars dock Pacific ports	3.05c

Heavy Cold-Rolled

	Base per Lb.
No. 10, gage, f.o.b. Pittsburgh	2.50c
No. 10, gage, f.o.b. Gary	2.60c
No. 10, gage, del'd Detroit	2.70c
No. 10, gage, f.o.b. Birmingham	2.81c
No. 10, gage, f.o.b. cars dock Pacific ports	3.05c

Galvanized Sheets

	Base per Lb.
No. 20, gage, f.o.b. Pittsburgh	2.95c
No. 20, gage, f.o.b. Gary	3.05c
No. 20, gage, del'd Detroit	3.15c
No. 20, gage, f.o.b. Birmingham	3.10c
No. 20, f.o.b. cars dock Pacific ports	3.50c

Light Cold-Rolled

	Base per Lb.
No. 24, gage, f.o.b. Pittsburgh	3.10c
No. 24, gage, f.o.b. Gary	3.20c
No. 24, del'd Detroit	3.41c
No. 24, f.o.b. Birmingham	3.25c
No. 24, f.o.b. cars dock Pacific ports	3.70c

Terne Plate

	Base per Lb.
(P.o.b. Pittsburgh)	
8-lb. coating I.C.	\$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under 1/4 in.

	Base per Lb.
All widths up to 24 in. Pgh.	1.85c
All widths up to 24 in. Chicago	1.85c
All widths up to 24 in. del'd Del.	2.05c
All widths up to 24 in. Birming.	2.00c
Cooperage stock, Pittsburgh	1.95c
Cooperage stock, Chicago	1.65c
Base per Lb.	
F.o.b. Pittsburgh	3.60c
F.o.b. Cleveland	2.60c
F.o.b. Gary	2.80c
F.o.b. Worcester	2.80c

Pender Stock

	Base per Lb.
No. 14, Pittsburgh or Cleveland	2.90c
No. 14, Worcester	3.00c
No. 20, Pittsburgh or Cleveland	3.30c
No. 20, Worcester	3.70c

Hot-Rolled Rail Steel Strips

	Base per Lb.
F.o.b. Pittsburgh	1.70c
F.o.b. Chicago	1.75c
F.o.b. Birmingham	1.85c
F.o.b. cars dock Gulf ports	2.00c

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	\$14.00 to \$14.50
No. 2 heavy melting steel	12.50 to 13.00
No. 3 railroad wrought	14.25 to 14.75
Scrap rails	14.25 to 14.75
Rails, 3 ft. and under	15.50 to 16.00
Compressed sheet steel	14.00 to 14.50
Hand bundled sheet steel	12.50 to 13.00
Hy. steel axle turnings	11.50 to 12.00
Machine shop turnings	9.75 to 10.25
Short shov. turnings	9.75 to 10.25
Short mixed borings and turnings	8.00 to 9.00
Cast iron borings	8.00 to 9.00
Cast iron carwheels	14.00 to 14.50
Heavy breakable cast	12.50 to 13.00
No. 1 cast	14.00 to 14.50
Ball. knuckles and couplers	15.75 to 16.25
Ball. coil and leaf springs	15.75 to 16.25
Bolled steel wheels	15.75 to 16.25
Low phos. billet crops	16.50 to 17.00
Low phos. sheet bar crops	16.00 to 16.50
Low phos. punchings	15.75 to 16.25
Low phos. plate scrap	15.25 to 15.75
Steel car axles	15.00 to 15.50

CHICAGO

Delivered Chicago district consumers:

Per Gross Ton	
Heavy melting steel	\$13.00 to \$13.50
Automobile hy. melt steel	11.50 to 12.00
Shoveling steel	13.00 to 13.50
Hydraulic comp. sheets	12.25 to 12.75
Drop forge flashings	10.75 to 11.25
No. 1 busheling	11.75 to 12.25
Roller carwheels	14.00 to 14.50
Railroad leaf springs	12.50 to 13.00
Axle turnings	12.50 to 13.00
Steel couplers and knuckles	14.00 to 14.50
Coil springs	15.00 to 15.50
Axle turnings (elec. fur.)	13.25 to 13.75
Low phos. punchings	14.00 to 14.50
Low phos. plates, 12 in. and under	14.25 to 14.75
Cast iron borings	6.00 to 6.50
Short shoveling turnings	6.00 to 6.50
Machine shop turnings	6.50 to 7.00
Rerolling rails	13.50 to 14.00
Steel rails, less than 3 ft.	14.50 to 15.00
Steel rails, less than 2 ft.	15.00 to 15.50
Angle bars, steel	14.00 to 14.50
Cast iron carwheels	13.25 to 13.75
Railroad malleable	15.75 to 16.25
Agricultural malleable	9.50 to 10.00

Per Net Ton

Iron car axles	\$16.00 to \$16.50
Steel car axles	14.00 to 14.50
No. 1 railroad wrought	11.00 to 11.50
No. 2 railroad wrought	11.75 to 12.25
No. 2 busheling, new	9.00 to 9.50
No. 2 busheling, old	6.50 to 7.00
Locomotive tires, smooth	12.00 to 12.50
Pipes and flues	7.00 to 7.50
No. 1 machinery cast	11.75 to 12.25
Clean automobile cast	11.00 to 11.50
No. 1 railroad cast	10.50 to 11.00
No. 1 agricultural cast	10.25 to 10.75
Stove plate	7.00 to 7.50
Grate bars	8.50 to 9.00
Brake shoes	8.50 to 9.00

PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$12.50
No. 2 heavy melting steel	\$11.00 to \$11.50
Hydraulic compressed, new	11.50 to 12.00
Hydraulic compressed, old	9.50 to 9.00
Steel rails for rolling	14.00 to 14.50
Out iron carwheels	13.00 to 13.50
Heavy breakable cast	12.00 to 12.50
No. 1 cast	13.00 to 13.50
Stove plate (steel works)	9.00 to 9.50
Railroad malleable	14.50 to 15.00
Mach. shop turnings	7.50 to 8.00
No. 1 blast furnace	6.00 to 6.50
Cast borings	6.00 to 6.50
Heavy axle turnings	9.50 to 10.00
No. 1 low phos. heavy	15.00 to 16.00
Couplers and knuckles	15.00 to 15.50
Rolled steel wheels	15.00 to 15.50
Steel axles	15.00 to 16.50
Shafting	18.00 to 18.50
No. 1 railroad wrought	12.00 to 12.50
Spec. iron and steel pipe	9.75 to 10.25
Bundled sheets	10.50 to 11.00
No. 1 forge fire	10.50 to 11.00
Cast borings (chem.)	10.50 to 13.00

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	\$10.50 to \$11.00
No. 2 heavy melting steel	8.50 to 9.00
Scrap rails for melting	9.75 to 10.25
Loose sheet clippings	6.50 to 7.00
Bundled sheets	7.75 to 8.25
Cast iron borings	6.00 to 6.50
Machine shop turnings	6.00 to 6.50
No. 1 busheling	7.25 to 7.75
No. 2 busheling	4.75 to 5.25
Rails for rolling	10.75 to 11.25
No. 1 locomotive tires	9.00 to 9.50
Short rails	13.50 to 14.00
Cast iron carwheels	10.50 to 11.00
No. 1 machinery cast	11.00 to 11.50
No. 1 railroad cast	10.25 to 10.75
Burnt cast	7.75 to 8.25
Stove plate	7.75 to 8.25
Agricultural malleable	9.75 to 10.25
Railroad malleable	11.00 to 11.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	\$12.75 to \$13.25
No. 2 heavy melting steel	11.75 to 12.25
Compressed sheet steel	12.25 to 12.75
Light bundled sheet stampings	9.25 to 9.75
Drop forge flashings	11.75 to 12.25
Machine shop turnings	7.50 to 8.00
Short shoveling turnings	7.50 to 8.25
No. 1 busheling	11.50 to 12.00
Steel axle turnings	10.75 to 11.25
Low phos. billet crops	16.00 to 16.50
Cast iron borings	7.50 to 8.00
Mixed borings and short turnings	7.50 to 8.00
No. 2 busheling	7.50 to 8.00
No. 1 cast	13.50 to 14.00
Railroad grating bars	7.00 to 7.50
Stove plate	7.50 to 8.00
Rails under 3 ft.	15.50 to 16.00
Rails for rolling	15.50 to 16.00
Railroad malleable	15.50 to 16.00
Cast iron carwheels	12.75 to 13.00

ST. LOUIS

Dealers' buying prices per gross ton delivered consumers' works:

Selected heavy steel	\$11.00 to \$11.50
No. 1 heavy melting	10.75 to 11.25
No. 2 heavy melting	9.00 to 9.50
Machine shop turnings	9.75 to 10.25
Short shoveling turnings	7.25 to 7.75
No. 1 busheling	11.50 to 12.00
Steel axle turnings	10.75 to 11.25
Low phos. billet crops	16.00 to 16.50
Cast iron borings	7.50 to 8.00
Mixed borings and short turnings	7.50 to 8.00
No. 2 busheling	7.50 to 8.00
No. 1 cast	13.50 to 14.00
Railroad grating bars	7.00 to 7.50
Stove plate	7.50 to 8.00
Rails under 3 ft.	15.50 to 16.00
Rails for rolling	15.50 to 16.00
Railroad malleable	15.50 to 16.00
Cast iron carwheels	12.75 to 13.00

Borings and short turnings	23.25 to 25.75
Long turnings	5.50 to 5.80
No. 1 machinery cast	12.50 to 13.00
Automotive cast	13.00 to 13.50
Hydraulic comp. sheets	9.75 to 10.25
Stove plate	7.75 to 8.25
New factory busheling	9.00 to 9.50
Old No. 2 busheling	5.00 to 5.50
Railroad turnings	12.00 to 12.50
Bundled sheets	7.50 to 8.00
No. 2 railroad wrought	10.50 to 11.00
No. 1 busheling	6.50 to 7.00
Cast iron borings and shoveling turnings	3.00 to 3.50
Rails for rolling	12.50 to 13.00
Machine shop turnings	2.75 to 3.25
Heavy turnings	8.00 to 8.50
Steel car axles	12.50 to 13.00
Iron car axles	15.00 to 16.00
No. 1 railroad wrought	8.50 to 9.00
Steel rails less than 3 ft.	13.00 to 13.50
Steel angle bars	9.00 to 9.50
No. 1 machinery cast	11.25 to 11.50
Railroad malleable	13.25 to 13.75
Wrought pipe	4.00 to 4.00
Steel axles	8.00 to 8.50
Axles, wrought iron	8.00 to 8.50
No. 1 machinery cast	9.50 to 9.00
Stove plate	6.50 to 7.00
Malleable	7.50 to 7.00

CANADA

Dealers' buying prices per gross ton:

Heavy melting steel	\$28.00 to \$28.50
Rails, scrap	8.50 to 8.00
Machine shop turnings	3.50 to 3.50
Boiler plate	5.00 to 5.00
Heavy axle turnings	4.50 to 4.00
Steel angle bars	12.50 to 13.00
No. 1 machinery cast	11.25 to 11.50
Railroad malleable	13.25 to 13.75
Wrought pipe	4.00 to 4.00
Steel axles	8.00 to 8.50
Axles, wrought iron	8.00 to 8.50
No. 1 machinery cast	9.50 to 9.00
Stove plate	6.50 to 7.00
Malleable	7.50 to 7.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	\$12.00 to \$12.50
No. 2 heavy melting scrap	11.00 to 11.50
Scrap rails	12.00 to 12.50
New hydraulic comp. sheets	11.00 to 11.50
Old hydraulic comp. sheets	9.00 to 9.50
Drop forge flashings	11.00 to 11.50
No. 1 busheling	11.00 to 11.50
Hy. steel axle turnings	10.50 to 11.00
Machine shop turnings	6.50 to 7.00
Knuckles and couplers	13.00 to 14.00
Coil and leaf springs	13.00 to 14.00
Rolled steel wheels	13.00 to 14.00
Low phos. billet crops	14.50 to 15.00
Short shov. steel turnings	7.50 to 8.00
Short mixed borings and turnings	7.50 to 8.00
Cast iron borings	7.50 to 8.00
Mixed borings and short turnings	7.50 to 8.00
No. 2 busheling	7.50 to 8.00
No. 1 cast	13.00 to 14.00
Railroad grating bars	7.00 to 7.50
Stove plate	7.00 to 7.50
Steel rails, 3 ft. and under	14.50 to 15.00
Steel rails less than 3 ft.	12.00 to 12.50
Railroad malleable	15.00 to 15.50
Chemical borings	9.00 to 9.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	\$9.75
Scrap rails	10.00
No. 2 steel	8.75
No. 2 steel	6.50 to 6.75
Breakable cast	6.75 to 7.00
Machine shop turnings	4.50 to 5.00
Machine shop turnings	5.25 to 5.50
Shafting	6.00 to 6.25
Stove plate	13.00 to 13.25
Steel car axles	12.50 to 13.00
Steel axles	13.50 to 14.00
No. 1 railroad wrought	3.50 to 4.00
No. 1 yard wrought long.	7.50 to 8.00
Spec. iron and steel pipe	6.00 to 6.50
Forgo fire	6.50 to 7.00
Rails for rolling	9.00 to 10.00
Short shoveling turnings	3.50 to 4.00

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	3.15c.
Structural shapes	3.15c.
Soft steel bars and small shapes	2.95c.
Reinforcing steel bars	2.90c.
Cold-finished and screw stock:	
Rounds and hexagons	3.20c.
Squares and flats	3.20c.
Hoops and bands under $\frac{1}{4}$ in.	3.20c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.30c.
Galv. sheets (No. 24), 25 or more bundles	3.95c.
Hot-rolled sheets (No. 10)	2.95c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	33.69
Spikes, large	3.20c.
Track bolts, all sizes, per 100 count, 65 per cent off list.	
Machine bolts, 100 count, 65 per cent off list.	
Carriage bolts, 100 count, 65 per cent off list.	
Nuts, all styles, 100 count, 65 per cent off list.	
Large rivets, base per 100 lb.	33.50
Wire, black, soft ann'l'd, base per 100 lb.	2.70
Wire, galv. soft, base per 100 lb.	2.95c.
Common wire nails, per kg.	2.83c.
Cement coated nails, per kg.	2.83c.
On plates, structural, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lbs.	
*Delivered in Pittsburgh switching district.	

CHICAGO

	Base per Lb.
Plates and structural shapes	3.20c.
Soft steel bars, rounds	3.00c.
Soft steel bars, squares and hexagons	3.15c.
Cold-fin. steel bars:	
Rounds and hexagons	3.35c.
Flats and squares	3.35c.
Hot-rolled strip	3.30c.
Hot-rolled annealed sheet (No. 24)	3.85c.
Galv. sheets (No. 24)	4.55c.
Hot-rolled sheets (No. 10)	3.05c.
Spikes (kg lots)	3.50c.
Track bolts (kg lots)	4.65c.
Rivets, structural (kg lots)	3.65c.
Rivets, boiler (kg lots)	3.75c.
Per Cent Off List	
Machine bolts	70
Carriage bolts	70
Lag screws	70
Hot-pressed nuts, sq. tap. or	
Hot-pressed nuts, sq. tap. or blank	70
Hot-pressed nuts, hex. tap. or	
Hot-pressed nuts, hex. tap. or blank	70
Hex. head cap screws	87c.
Cut point set screws	89
Flat head bright wood screws, 50 and 20	
Spring cotters	55
Stove bolts in full packages	70
Rd. hd. tank rivets, 7/16 in. and smaller	57c.
Wrought washers	4.50c. off list
Black ann'l'd wire per 100 lb.	33.85
Common wire nails, base per kg.	2.95c.
Cement c'td nails, base per kg.	2.95c.
On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies to orders of 400 to 9999 lbs. All prices are f.o.b. consumers' plants within the Chicago switching district.	
These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 65 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b. Chicago, with full or partial freight allowed up to 50c. per 100 lb.	
*Prices for city and suburbs only.	

NEW YORK

	Base per Lb.
Plates, $\frac{1}{4}$ in. and heavier	3.40c.
Structural shapes	3.37c.
Soft steel bars, rounds	3.31c.
Iron bars	3.31c.
Iron bars, swed. charcoal, 6.75c. to 7.00c.	
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.81c.
Flats and squares	3.81c.
Cold-rolled strip, soft and quarter hard	3.36c.
Hoops	3.55c.
Bands	3.56c.
Hot-rolled sheets (No. 10)	3.31c.
Hot-rolled ann'l'd sheets (No. 24)*	3.89c.
Galvanized sheets (No. 24)*	special
Long ferne sheets (No. 24)	5.25c.
Standard tool steel	11.00c.
Wire, black annealed (No. 10)	3.40c.
Wire, galv. (No. 10)	3.75c.
Tire steel, 1 x $\frac{1}{2}$ in. and larger	3.75c.
Open hearth spring steel	4.00c. to 10.00c.
Common wire nails, base per kg.	33.21
Per cent off list	
Machine bolts, square head and nut:	
All diameters	70 and 10
Carriage bolts, cut thread:	
All diameters	65 and 10

	Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.		\$15.05
Seamless welded, 2-in.		19.24
Charcoal iron, 2-in.		21.98
Charcoal iron 4-in.		63.65
"No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.		

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.45c.
Bars, soft steel (rounds and flats)	3.25c.
Bars, hot steel (squares, hexagons, oval, half ovals and half rounds)	3.40c.
Cold-fin. rounds, shafting, screw stocks	3.60c.
Hot-rolled annealed sheet (No. 24)	4.10c.
Hot-rolled sheets (No. 10)	3.10c.
Black corrug. sheets (No. 24)	4.10c.
*Galv. corrug. sheets	4.65c.
Structural rivets	4.10c.
Boiler rivets	4.10c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts:	
All quantities	70
"No. 26 and lighter take special prices.	

PHILADELPHIA

	Base per Lb.
*Plates, $\frac{1}{4}$ -in. and heavier	2.98c.
*Structural shapes	2.98c.
*Soft steel bars, small shapes, iron bars (except bands)	3.03c.
Reinforce. steel bars, sq. twisted and deformed	2.96c.
Cold-finished steel bars	3.61c.
*Steel bands	3.42c.
*Steel bands, No. 12 and 3/16 in. incl.	3.18c.
Spring steel	5.00c.
Hot-rolled annealed sheet (No. 24)	3.65c.
Galvanized sheets (No. 24)	4.40c.
Hot-rolled annealed sheets (No. 10)	3.08c.
Diam. pat. floor plates, $\frac{1}{4}$ in.	4.95c.
Swedish iron bars	6.25c.
	These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.
	*Base prices subject to deduction on orders aggregating 4000 lb. or over.
	For 50 bundles or over.
	For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.31c.
Soft steel bars	3.00c.
Reinforce. steel bars	2.10c.
Cold-finished steel bars	3.25c.
Hot-rolled strip under $\frac{1}{4}$ in.	3.36c.
Cold-finished strip	13.00c.
Hot-rolled annealed sheet (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.11c.
Hot-rolled sheets (No. 10)	3.11c.
Hot-rolled 3/16 in. to 48 in. wide sheets	5.56c.
"Black ann'l'd wire, per 100 lb.	42.75
No. 9 galv. wire, per 100 lb.	3.10
*Common wire nails, base per kg.	2.70
	*Outside delivery 10c. less.
	*For 5000 lb. or less.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.42c.
Bars, rounds, flats and angles	3.22c.
Other shapes	3.37c.
Rail steel reinforce. bars	3.25c.
Hoops and bands, 3/16 in. and lighter	3.47c.
Cold-finished bars	3.57c.
Hot-rolled annealed sheet (No. 24)	4.02c.
Galv. sheets (No. 24)	4.72c.
Hot-rolled sheets (No. 10)	3.22c.
Structural rivets	4.35c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	42.88
Common wire nails, base per kg.	
All quantity less than carload	
Cement c'td nails, base 100-lb. kg.	3.50
Chain, lin. per 100 lb.	3.35
Net per 100 Ft.	
Seamless steel boiler tubes, 2-in.	\$20.37
4-in.	58.14
Lap-welded steel boiler tubes, 2-in.	19.38
4-in.	45.32

BUFFALO

	Base per Lb.
Plates	3.38c.
Struc. shapes	3.25c.
Soft steel bars	3.05c.
Reinforcing bars	2.60c.

BOSTON

	Base per Lb.
Beams, channels, angles, tees, zees	3.54c.
H beams and shapes	3.54c.
Plates—Sheered, tank and univ. mill, $\frac{1}{4}$ in. thick and heavier	3.56c.
Structural rivets	3.45c.
Bar and bar shapes (mild steel)	3.45c.
Bands 3/16 in. thick and	
No. 12 ga. incl.	4.65c.
Half rounds, half ovals, oval and bevels	4.70c.
Tire steel	4.70c.
Cold-rolled strip steel	3.245c.
Cold-finished rounds, squares and hexagons	3.75c.
Cold-finished flats	3.75c.
Blue annealed sheets, No. 10 ga.	3.65c.
One pass cold-rolled sheets No. 24 ga.	5.20c.
Galvanized steel sheets, No. 24 ga.	5.90c.
Lead coated sheets, No. 24 ga.	6.85c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

	Base per Lb.
Soft steel bars	3.07c.
Structural shapes	3.42c.
Plates	3.42c.
Floor plates	3.17c.
Hot-rolled annealed sheet (No. 24)	3.94c.
Hot-rolled sheets (No. 10)	3.14c.
Galvanized sheets, No. 10 ga.	4.72c.
One pass cold-rolled sheets No. 24 ga.	5.20c.
Galvanized steel sheets, No. 24 ga.	5.90c.
Lead coated sheets, No. 24 ga.	6.85c.

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials.

*Price applies to 1,000 lb. and over.

MILWAUKEE

	Base per Lb.
Plates and structural shapes	3.31c.
Soft steel bars, rounds up to 8 in., flats and fillet angles	3.11c.
Soft steel bars, squares and hexagons	3.26c.
Hot-rolled strip	3.41c.
Hot-rolled sheets (No. 10)	3.16c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.66c.
Cold-finished steel bars	3.46c.
Cold-rolled strip	3.33c.
Structural rivets (kg lots)	3.36c.
Boller rivets, cone head (kg lots)	3.96c.
Track spikes (kg lots)	3.71c.
Black annealed wire	3.25c.
Common wire nails	2.95c.
Cement coated nails	2.95c.

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 4999 lb. On cold-finished bars and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 1500 lb. On cold-finished bars the prices are for orders of 1000 lb. or more of a size.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	3.25c.
Structural shapes	3.45c.
Plates	3.45c.
Cold-finished bars	3.87c.
Bands and hoops	3.55c.
Hot-rolled annealed sheets, No. 24	3.90c.
Galvanized sheets, No. 24	4.50c.
Cold-rolled sheets, No. 24	4.95c.

On mild steel bars, shapes, plates and bands and hoops the base applies on 400 to 4999 lb. On cold-finished bars, hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over.

BALTIMORE

Threat of Higher Prices Reappears at Philadelphia



First Quarter Ordering Somewhat
Heavier—Awards of Shapes and
Bars are Light—Scrap Export Strong

PHILADELPHIA, Dec. 17.—There are growing indications that consumers of steel may still have to pay higher prices for their 1936 requirements. At least two large sellers in this district have notified certain customers that first quarter coverage to the fullest extent that their finances permit would be advisable now, as the general price advance, which recently was threatened but not carried through, may be made early in the first quarter. This action may be just a threat but definite price action is not unlikely. Many mills were disappointed when their more influential competitors reaffirmed prices several weeks ago, and these same companies have subsequently been agitating for higher prices to bring their return more in line with current producing costs. Some large consumers are entering tentative orders, but the attitude in the district as a whole is to delay buying until some definite action is apparent. It is known from experience that sufficient time is generally provided to enable buyers to enter protective orders at the last moment.

Seven car builders shared in the award of 4000 freight cars by the Pennsylvania and the carrier will construct 6000 in its own shops. Although steel has not been bought, the 65,000 tons involved is expected to be distributed among about 20 steel makers during the next two weeks. Probably the allocation will be made on the basis of car loadings from these companies over the past 22 months. In addition, the Pennsylvania opened Clayton Act bids today covering 5000 tons of routine first quarter requirements.

The major producer in this area has taken off several open hearths, and the district rate is consequently down one point to 38 per cent of capacity. Smaller mills here are enjoying exceptionally good business for this time of the year, and the general expectation is that op-

erations will be sustained through the holiday period.

Pig Iron

Foundry melt is holding up very well. Pipe makers report increased backlog as the result of accelerated PWA buyings. This situation is particularly conspicuous inasmuch as this time of the year is not ordinarily a pipe season. Consumers have come into the market for a little first quarter tonnage, but market attention is, for the most part, centered in deliveries against outstanding fourth quarter orders. Releases are being received in good volume. Nevertheless, a moderate tonnage will still be on sellers' books at the end of the year, and it is not improbable that

this iron will be quietly delivered during the first quarter.

Sheets and Strip

Some first quarter business has been forced in by reports that price advances may actually be established early in the year. Most buyers, however, are delaying definite action until after the inventory period. Day-to-day purchases for immediate shipment have declined, but deliveries on book orders are going forward in good volume. Sheet consumption here is expected to be maintained at present levels well into the first quarter.

Bars, Plates and Shapes

The Pennsylvania Railroad is taking Clayton Act bids on 5000 tons for first quarter delivery. Likewise, this railroad will soon distribute orders among about 20 makers for 65,000 tons of plates, shapes and bars to build 6000 cars. Newport-News Shipbuilding & Drydock Co. has been awarded a contract covering construction of a vessel for the United States Lines. Although this ship will be smaller than originally intended, the total steel required will probably be about 15,000 tons. Over 800 tons of shapes was awarded last week to fabricators in this area, but many large projects are still pending. McCloskey & Co. have been awarded the general contract on the North East High School and also on four smaller schools on

TRIPLE COMPRESSION SCRAP BALERS



STYLE
100 TC
(100 x 51 x 36)
and other sizes
▼
Also Regular
Double
Ram Presses
in all sizes



GALLAND-HENNING
MANUFACTURING COMPANY

2724 S. 31st Street Milwaukee, Wisconsin

COMPLETE LINE OF BALERS: Electric and Hydraulic, also HYDRAULIC PRESSES AND PUMPS



A. Leschen & Sons Rope Co.

3909 Kennerly Avenue
ST. LOUIS, MO.

New York 87 to 90 West Street
Chicago 810 W. Washington Blvd.
Denver 1554 Wazee Street
San Francisco 520 Fourth Street

Round Strand
Flattened Strand
"P. F. S."
Non-Rotating
Preformed
Steel Clad
Locked Coil
Regular Lay
Lang's Lay
Hemp Center
Wire Rope Center
Metallic Core
Seale-Filler Wire
Warrington

which bids were taken last week. McShain & Co. have been awarded an elementary school on Conrad Street. No action has been taken on three other schools on which bids are in.

Imports

The following iron and steel imports were received here last week: 1901 tons of pig iron from British India; 57 tons of steel tubes, 31 tons of steel bars and 9 tons of steel forgings from Sweden, and 25 tons of manganese ore from the United Kingdom.

Scrap

Practically all of the Claymont, Del., orders have been liquidated, but No. 1 and No. 2 steel are still being delivered to Coatesville. Harrisburg has temporarily held up orders on breakable cast. Nevertheless this grade has lost none of its strength, and brokers are willing to pay close to \$12 delivered to consuming points. Bethlehem is taking unprepared at Bethlehem, and continues to offer \$11 and \$10 for No. 1 and No. 2, respectively, for Sparrows Point, Md., delivery. The most interesting feature in this market is potential export business. A New York bank has approached practically every seller here and in Baltimore for lots up to a total of 50,000 tons for Italian delivery. It is quite likely that

some of this business will be placed, for cash is available and Italy wants the scrap. In addition, Japan is expected to come into the market for greater amounts in the near future. Union Shipbuilding Co., Baltimore, has placed no export or domestic tonnages, and is still holding out for \$13 for any No. 1 business which may mature.

St. Louis Market

Is Quiet

ST. LOUIS, Dec. 17.—The buying of finished iron and steel in this market is reported to be comparatively light. A considerable tonnage of structural steel and reinforcing bars is expected as a result of Government lettings, although nearly all of the projects, which have filled the estimating departments to overflowing, are for much less than 100 tons. Delay in getting approval of projects for which contracts have been tentatively let to low bidders also is said to be holding up placing of orders.

An advance of \$3 a ton in wire and fencing is expected to be put into effect beginning with the first quarter.

Railroad car buying among the lines centering here, which is still in the "consideration" stage, is expected to be stimulated by the action of the Pennsylvania in placing its order for 10,000 cars. A bridge over the Maramec River connecting St. Louis and Jefferson counties, requiring 750 tons, has been awarded to Stupp Brothers Bridge & Iron Co.

La Clede Tube Co. has been awarded 1500 tons of 1-in. light-wall steel tubing for use in cooling concrete at the Grand Coulee dam, Odair, Wash.

While prices of scrap are unchanged, the market is reported to be showing some signs of easing. Dealers do not expect any buying by the mills in the district until late in January, and offerings from the outside are heavier.

Shipments of pig iron continue to be very heavy, but they are said to be not quite up to expectations in view of the large quantity bought for delivery before Jan. 1 at a price \$1 a ton less than prevails now. The melt in the district is holding up well, especially among the steel plants, and no let-down during the holidays is expected.

TRADE NOTES

Triplex Machine Tool Corp., New York, has opened branch office at 20 Fern Street, Auburndale, Boston, under management of Frank A. Parker. Company has also added Ray E. Sterling, P.O. Box 745, Meriden, Conn., to its sales force.

The Emerson Electric Mfg. Co., St. Louis, has opened branch sales office at suite 316, Stormfeitz-Loveley Building, Woodward and Grand Boulevard, Detroit.

General Refractories Co., Philadelphia, has appointed Bird-Archer Co., Philadelphia, as dealer agent in the Philadelphia area.

Howe Pattern Mfg. Co., 1415 Trombly Avenue, Cleveland, has changed name to Howe Pattern Corp.

Cerby Supply Co., St. Louis, has been appointed representative for the vices made by Athol Machinery & Supply Co., Athol, Mass.

Gustav Glaser Co., Inc., has moved to new plant at Thirtieth Street and Eleventh Avenue, New York. Modernized manufacturing facilities have been installed.

Caterpillar Tractor Co., Peoria, Ill., has granted franchise to Machinery & Welder Corp., 240 South Boyle Avenue, St. Louis.

for sales of electric welding units mounted on Caterpillar tractors to railroads and other corporations in Illinois, Missouri, Kansas, eastern Iowa, southern Wisconsin, northwestern Indiana and the upper peninsula of Michigan. Welding units covered by franchise consist of General Electric generators mounted on Caterpillar track-type tractors and driven by tractor engine through V-belts and a rear power take-off.

The L. S. Starrett Co., Athol, Mass., recently acquired business of Henry A. Lowe Co., Cleveland, manufacturers of line of "Last Word" indicators. All equipment for manufacture of these instruments has been moved to Starrett works in Athol.

George R. Woods, 17 Battery Place, New York, has been named American representative for the chrome hardening processes and patents of Ingenieursbureau "Lemet Chromium," Hilversum, the Netherlands, H. Van Der Horst.

Materials Handling Equipment Parts, Jeffrey Mfg. Co., Columbus, Ohio. Catalog 417 (400 pages), covering chains, sprockets, transmission machinery; spiral conveyor, elevator and conveyor parts, along with all other Jeffrey materials handling equipment parts. Gives specifications and list prices; presents pictorially line of materials handling equipment engineered, manufactured and erected by Jeffrey company.

Materials Handling, Jeffrey Mfg. Co., Columbus, Ohio. Electric vibrating equipment of Jeffrey-Traylor type is featured in new Catalog 610 (64 pages). It describes this equipment which has no mechanical wearing parts; gives specifications of the various types; deals extensively with typical installations covering feeding, screening, conveying, packing, cooling, drying and other handling operations.

Railroad Equipment

The Pennsylvania has placed orders for 10,000 freight cars, divided as follows: American Car and Foundry Co., 800; Bethlehem Steel Co., 600; General American Car Co., 400; Greenville Steel Car Co., 250; Pressed Steel Car Co., 1000; Pullman Standard Car Mfg. Co., 700; Ralston Steel Car Co., 250. The company will build 6000 cars in its own shops.

Westinghouse Air Brake Co. has received order from the Pennsylvania for 10,000 complete sets of its new type "AB" brake equipment for use on its 10,000 new freight cars.

Union Pacific has authorized purchase of two 10-car streamlined trains with 2400-hp. Diesel-driven units, for service between Chicago and Denver.

Milwaukee Road has resumed its freight and passenger car repair schedule, completion of which will require two and four years respectively. The work will employ 1200 men on a 40-hr. week to repair two passenger and 20 freight cars a day.

Bartex Pipe Line Co. has ordered 20 50-ton tank cars from General American Tank Car Corp.

Atchison, Topeka & Santa Fe has approved a 1936 budget providing for expenditure of \$28,408,973 for equipment, repair and general improvement purchases.

THERE IS
ONLY ONE
LOGICAL
MATERIAL

WHERE SIZE
TRUE CROSS SECTION
ACCURACY
STRAIGHTNESS
MACHINABILITY
AND SUPERIOR
SURFACE CONDITION
ARE ESSENTIAL

WYCKOFF
COLD DRAWN STEEL



WYCKOFF DRAWN STEEL COMPANY

General Offices: First National Bank Bldg., Pittsburgh, Pa.

Mills at Ambridge, Pa. and Chicago, Ill.

Manufacturers of Carbon and Alloy Steels
Turned and Polished Shafting Turned and Ground Shafting

Milwaukee Road has ordered a Hiawatha-type locomotive from American Locomotive Co.

Chicago, Burlington & Quincy has ordered a 900-hp. Diesel-electric locomotive from Cummins Engine Co., Columbus, Ohio.

New York Central is rebuilding and air-conditioning seven suburban coaches and is reconditioning a Pacific-type locomotive.

St. Louis, San Francisco is considering purchase of 2000 cars.

RAILS

Central of Georgia has ordered 4500 tons of 90-lb. rails from Tennessee Coal, Iron & Railroad Co.

St. Louis-San Francisco Railway Trustee has asked Federal Court to authorize \$1,835,516 expenditures for calendar year 1936, including \$720,387 for 100 miles new 112-lb. rails and tie plates and 2,200,000 tie plates, including rail anchors, etc., and automatic block signals, \$137,991; car repairs, \$266,072, and air conditioning 14 coaches, \$61,031.

Lorain Steel Co., Johnstown, Pa., has been awarded 125 tons of girder rails for the Commonwealth pier, Boston.

Demand in Seasonal Dip In New York Area



Greater Tonnage Coming from Oil Companies and Railroads—Wire Nail Differentials Abolished

NEW YORK, Dec. 17—Mill bookings are showing the effects of the season, although one or two sellers report that specifications are still running ahead of November. Tin plate releases have slumped, and new sheet business is light. However, on existing commitments some sheet mills are booked tight until mid-January.

Oil companies are taking a more active interest in the market and will shortly place large orders for both tanks and tankers. The Sun Shipbuilding & Dry Dock Co. is low bidder on two tankers, requiring 10,000 tons of plates, for the Socony-Vacuum Oil Co. Several other tankers are pending. The award of 10,000 cars by the Pennsylvania Railroad is regarded as the harbinger of other sizable railroad equipment orders.

Demand for structural steel fluctuates in synchronism with the award of large individual projects. United States Steel Corp. subsidiaries have the contracts for supplying a total of 5800 tons, including structural steel, bearing piles, plates and reinforcing bars, for the Commonwealth pier, Boston. The McClintic-Marshall Corp. is low bidder on 2200 tons of structural steel for a building for the Sheffield Farms Co. at Jamaica, N. Y.

N. Y., and Bethlehem Fabricators, Inc., is low on 1150 tons for the Bronx Borough highway, New York. The plans are out on two additional buildings for Rockefeller Center, New York, requiring about 1000 tons apiece. About 1300 tons is in the market for New Jersey State highway bridges.

Pending pipe jobs calling for plates include 8300 tons for the city of St. Louis, 500 tons for the city of Niagara Falls, N. Y., and 800 tons for Cleveland. United Dry Docks, Inc., was awarded three ferries instead of one ferry by New York City. The plate requirements total 4500 tons.

Quantity extras on wire nails, barbed wire, woven wire fence, bale ties, staples and annealed fence wire, which were adopted last August, have been abolished. Existing base prices now apply for straight and mixed carloads. The extra for less-than-carload orders has been advanced from \$2 to \$4 a ton. The former jobbers' discount of \$2 a ton has been restored.

Pig Iron

Although the broad status of the market has not appreciably altered since last reported, in some cases, consumers last week were compelled to book a little additional

iron for year-end requirements. Total sales of 1450 tons included 500 tons booked by one producer against an old requirement contract. Shipments were heavy during the week, and certain producers report that remaining unfilled orders now amount to only one or two carloads. As yet no proclivity to buy for first quarter needs has been evinced by consumers. Possibly part of last week's business was for carry-over purposes, but information of this nature is hard to substantiate. By and large, underestimated needs accounted for the bulk of last week's sales, and sellers momentarily expect no noticeable change in the market. The State's barge canal traffic season came to a close Dec. 14 when the last traffic moved into the Hudson River and channel markers and buoys were taken up.

Reinforcing Steel

The market for bars, as previously reported, has been weakened by competitive bidding. A number of New Jersey State highway jobs became open to bids Dec. 16, but sizable tonnages of this nature are still in the formative stage. At New Brunswick, N. J., a sewer project, calling for 215 tons, was let to the Industrial Engineering Co., New York. An award of 800 tons for a PWA sewage project in the Bronx, has practically been completed, but awaits the clearing up of incidentals. Approximately 300 tons is still pending in connection with the Sheffield Farms building at Jamaica, N. Y. Foundation work for a \$400,000 theatre at New Brunswick, N. J., it is estimated, will take a considerable amount of reinforcing bars, but tenders are not expected before early January. On Dec. 19, bids will be taken on the readver-

DATA SHEETS

DESCRIBING OUR HY-TEN, ECONOMO & S.A.E. ALLOYS

GLADLY MAILED ON REQUEST

WHEELOCK, LOVEJOY & COMPANY, INC.

CAMBRIDGE

CLEVELAND

CHICAGO

NEWARK

DETROIT

STAMPINGS

Specialists in
DEEP DRAWN STAMPIINGS
TRANSUE & WILLIAMS

bu TRANSUE

tised 1400 tons for the New Jersey approach to the Hudson-Midtown tunnel.

Scrap

Quotations on important grades continue to be very strong in this market. A fair volume of material is being collected for foreign delivery, but brokers are, for the most part, basing their bullish position on the sizable new buying which they firmly believe will develop within the next month. One New York bank has established sufficient credit to cover No. 2 steel purchases of between 50,000 to 100,000 tons for Italian delivery. This same bank has been indirectly in touch with every local broker asking for quotations on sizable lots on a cash basis, and tentative offers have been made on the average of \$2.50 above the current market. Evidently brokers want some protection against a rising market, for such a sale would naturally force prices up and further accentuate the present market tightness. One boat left for Japan last week, an Italian boat for eventual scrapping is now loading and two additional steamers are currently taking on steel for other

European consumers. The domestic situation has not altered to any significant extent. Demands from eastern Pennsylvania are not urgent, and only a moderate quantity of No. 1, No. 2 and cast grades is moving in that direction.

Rate Holds in Lower Ohio River Area

INCINNATI, Dec. 17.—Pig iron demand is tapering as melters prepare for year-end inventories. Bookings of the past week totaled about 1200 tons, consisting entirely of spot orders. Requisitions against contracts are undiminished and it is probable that virtually all material under contract will be taken by foundries. Foundry operations are tending downward as operators prepare for December stock taking. In fact, some plants may close for three weeks, while others will suspend operations for one week only.

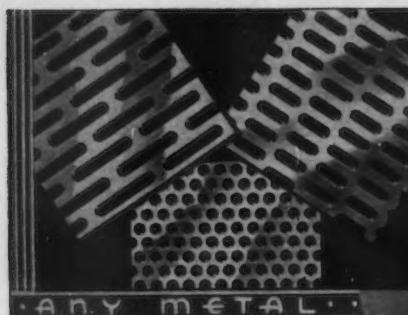
Bookings in finished sheets have receded slightly, but district mills will continue to run at full capac-

ity well into January to care for backlog. New business averaged about 85 per cent of mill capacity in the past week. Steel ingot output is unchanged at 82 per cent. The movement of steel manufacturers to obtain higher prices, despite formal affirmation of fourth quarter prices for the New Year, is meeting with little, if any, opposition from users and adds to the buoyant undertone of the market.

Government activity in construction financing is stimulating the fabricated steel and reinforcing bar markets. Bids are awaited on a 2500-ton bar job for the Kentucky highway department.

Steel jobbers are benefiting from Governmental construction jobs and December business adheres closely to the satisfactory level of November. Industrial ordering is undiminished.

The scrap market is strong in anticipation of heavier first quarter ordering. Dealers' bids are higher and speculative buying is greater than last week. Current ordering by consumers is for immediate needs.

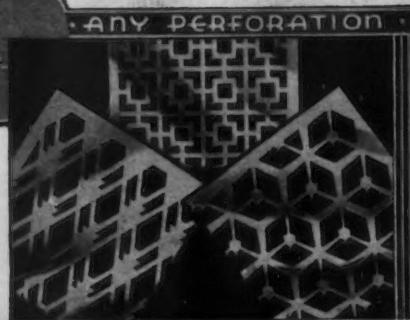


Industrial screens perform at highest efficiency with H & K precision perforations, which are made in all metals to meet exacting requirements.

Ornamental Perforations for Grilles and Enclosures. Many beautiful and exclusive designs from which to select.

Send us your specifications for quotation.

INDUSTRIAL AND ORNAMENTAL • SCREENS •



The Harrington & King
PERFORATING CO.

5657 Fillmore Street, Chicago, Illinois

• 114 Liberty Street, New York, N. Y.

Automotive Engineers Plan 1937 Convention

THE mosaic of 1937 automobile design will be partly shown during the week of Jan. 13, when a record-breaking attendance is expected at the annual meeting of the Society of Automotive Engineers in Detroit. Six men, known throughout the industry for their keen interest in advanced design, will give a symposium on the car of the future.

What car owners think about safety in design will be statistically shown by H. G. Weaver, director of customer research, General Motors Corp., and Dr. Miller McClinton, director of the Harvard Bureau of Traffic Research, will discuss the broader aspects of traffic safety.

The lubrication woes of motor-vehicle fleet operators, developments in trucks, buses and rail cars, Diesel engine design, wear characteristics of engine cylinders, automobile body design, new production methods, fuel economy, aircraft designs of tomorrow, will be discussed by leading authorities in each field. An engineering display will show what is new in component parts and accessory design.

The car of the future, always an intriguing subject for engineers and automobile owners alike, will be one of the high spots of the

interesting program. William B. Stout, president of the society; Walter Dorwin Teague, designer; A. M. Wolf, automotive consultant; Herbert Chase, consulting engineer; John Tjaarda and A. E. Northup, both of whom have been leaders in modern body design, will form the symposium.

Contract for Liner Submitted to Roper

WASHINGTON, Dec. 17.—Steel requirements exclusive of machinery for the large liner to be built by the Newport News Shipbuilding & Dry Dock Co. for the United States Lines are estimated at about 15,000 tons, of which about 10,000 tons will consist of plates. The vessel is to be of Manhattan-Washington type, with a displacement of approximately 24,000 gross tons.

The United States Lines have submitted the contract with the Newport News company to Secretary of Commerce Roper. The contract price is \$11,900,000. The contract expressly provides that the contract will become effective only when it and the application for a construction loan, which has also been filed with the Department of Commerce, have been approved by the Secretary of Commerce.

Mills Owe Debt to PWA, Says Ickes

WASHINGTON, Dec. 17.—Harold L. Ickes, public works administrator, today said that PWA, through spending \$260,000,000 the past two years, had created 400,000 man-hours of labor in the iron and steel industry.

Mr. Ickes also gave credit to PWA for plans of steel companies for large expenditures for construction of new mills.

"If it hadn't been for PWA stimulation," said Mr. Ickes, "no steel company would be planning to spend such a sum as the \$40,000,000 involved in the program of the Jones & Laughlin Steel Corp. at Pittsburgh."

W. J. Filbert Retires; Stettinius Advances

AT the conclusion of a meeting of the board of directors of the United States Steel Corp. on Tuesday, Myron C. Taylor, chairman, announced the resignation of Percival Roberts, Jr., a member of the original board of directors and since 1911 a member of the finance committee. Edward R. Stettinius, Jr., since March, 1934, vice-chairman of the finance committee, has been elected a director to succeed Mr. Roberts. On Jan. 1, 1936, Mr. Stettinius will become chairman of the finance committee, succeeding William J. Filbert, who will retire at that time under the United States Steel Corp. pension plan.

New Trade Publications

Wheelabrator Abrasive Cleaning Method.—American Foundry & Equipment Co., Mishawaka, Ind. Book No. III, illustrated, devoted to the airless abrasive cleaning and preparation method termed Wheelabrating. The Wheelabrator is a mechanical device for throwing abrasive by centrifugal and tangential force on to products to be for preparation of a base finish, such as cleaned, such as castings or forgings, or the satin finish of metal stampings.

Felt for Mechanical, Electrical and Other Applications.—Booth Felt Co., 435 Eighteenth Street, Brooklyn, N. Y. Unique, copyrighted chart with compact set of samples of seven standard types of felt. Applications in mechanical and automotive, electrical and radio, polishing and plating, and other fields are conveniently classified.

Vitreous Enamel.—Ingram-Richardson Manufacturing Co., Beaver Falls, Pa. Circular describing uses of vitreous enamel for store fronts and other forms of exterior and interior building construction. Copies may be obtained by addressing the manufacturer.

Copper Sales Total 18,065 Tons on Opening Day of Week—Stocks Drop

Spread Between Spot and Futures Leads to Fair Buying of Tin for Forward Positions—Demand for Zinc Slightly Heavier—Lead Unchanged

NEW YORK, Dec. 17.—Despite the uncertainty prevailing abroad among copper interests, the prevalence of domestic demand was accentuated yesterday when 18,065 tons was sold. Combined with week-end sales of 1045 tons, yesterday's surprising turnover raised the month's total to 43,155 tons. Whether because of November statistics, actual replacement needs, or a special interpretation placed upon international complications by consumers themselves, the more active state of inquiry compares favorably with November's business, when only 32,000 tons was marketed in the entire month. Fabricators were

not especially active in the week's business, but independents are reported to have increased their take as against prior tendencies for producer-owned interests to monopolize the buying. A further wholesome feature of the situation is the attitude of secondary interests who, it is stated, are withholding scrap metal in the interests of higher prices. Still it is not possible to take a long view of the market owing to complications abroad where the changed status of silver and war politics is upsetting the trade. Electrolytic in London currently is quoted at about 8.65c. a lb. The domestic level of 9.25c. is unusually strong.

The Week's Prices. Cents Per Pound for Early Delivery

	Dec. 11	Dec. 12	Dec. 13	Dec. 14	Dec. 15	Dec. 17
Lake copper, N. Y.	9.00	9.00	9.00	9.00	9.00	9.00
Straits tin, spot, New York†....	49.75	49.50	49.62 1/2	49.85	49.87 1/2	49.87 1/2
Zinc, East St. Louis....	4.85	4.85	4.85	4.85	4.85	4.85
Zinc, New York†....	5.22 1/2	5.22 1/2	5.22 1/2	5.22 1/2	5.22 1/2	5.22 1/2
Lead, St. Louis....	4.35	4.35	4.35	4.35	4.35	4.35
Lead, New York....	4.50	4.50	4.50	4.50	4.50	4.50

*Refinery quotations; price 1/4c. higher delivered in Connecticut.

†Includes emergency freight charge.

Aluminum, virgin 99 per cent plus, 19.00c.-22.00c. a lb., delivered. Aluminum, No. 12 remelt, No. 2 standard, in carloads, 17.00c. a lb., delivered. Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more. Antimony, Asiatic, 14.50c. a lb., New York. Quicksilver, \$74.00 to \$75.00 per flask. Brass ingots, commercial 85-5-5-5, 9.25c. a lb., delivered; in Middle West 1/4c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig....	51.25c. to 52.25c.
Tin, bar....	49.25c. to 50.25c.
Copper, Lake....	10.25c. to 11.25c.
Copper, electrolytic....	10.25c. to 11.25c.
Copper, castings....	10.00c. to 11.00c.
*Copper sheets, hot-rolled....	16.25c.
*High brass sheets....	14.62 1/2c.
*Seamless brass tubes....	16.62 1/2c.
*Seamless copper tubes....	16.75c.
*Brass rods....	13.12 1/2c.
Zinc, slabs....	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over....	10.25c.
Lead, American pig....	5.00c. to 6.00c.
Lead, bar....	6.00c. to 7.00c.
Lead, sheets....	8.25c.
Antimony, Asiatic....	17.00c. to 18.00c.
Alum, virgin, 99 per cent, plus....	23.30c.
Alum, No. 1 for remelting, 98 to 99 per cent....	18.50c. to 20.00c.
Solder, 1/2 and 1/4....	31.00c. to 32.00c.
Babbitt metal, commercial grades....	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig....	54.25c.
Tin, bar....	56.25c.

Domestic refined shipments of copper in November totalled 55,587 tons. Stocks declined 5700 tons to 221,022 tons. Mine and scrap production in November reached 55,824 tons.

Tin

Inquiry for first and second quarter positions resulted in a fair volume of sales last week, although practically no buying of spot metal developed. Importers point out that while more plentiful supplies are in sight and prices consequently may taper off after the year-end, the existence of a 2c. discount between spot and futures at the present time gives consumers assurance that they hardly stand to lose noticeably by buying forward. The demand, as experienced by the trade last week, came primarily from the customary largest tin consuming interests. Lack of spot inquiry was attributed to the approaching inventory period. Prices remained steady all week, and today spot Straits metal at New York is quoted at 49.87 1/2c. a lb. In London this morning the price for standard prompt tin was £221, while futures were £211. The Eastern quotation was £216 2s. 6d.

Zinc

Sales of zinc were a little heavier last week when 6880 tons changed hands, compared with 3900 tons in the week before. Indications of any noticeable change in the market set-up are lacking, however. The undertone is firm, though quiet, and prices are sustained at the 4.85c. a lb. level. Domestic shipments of 47,870 tons in November exceeded the 37,690 tons produced by more than 10,000 tons. Stocks accordingly fell to 95,950 tons.

Lead

Inquiry in this market remains active, but certain quarters appear to be transacting heavier business than others. As opposed to the preceding period, last week's buying possibly eased off a bit, although no interests had more to offer than they could readily sell. Diversified inquiry continues to be the rule, and battery and paint interests figure most prominently. Toward the close of last week, however, foil makers tended to overshadow the rest of the trade. Cable makers, while by no means active in a potential sense, accounted for some business. December positions are now thought to be approximately 95 per cent covered. January, it is estimated, is 50 per cent sold, but remaining needs should sustain purchases through the rest of this month. The price is firm at 4.50c. a lb.

Copper, Lake....	10.25c.
Copper, electrolytic....	10.25c.
Copper, castings....	10.00c.
Zinc, slabs....	6.25c. to 6.50c.
Lead, American pig....	5.20c. to 6.50c.
Lead, bar....	3.50c.
Antimony, Asiatic....	17.50c.
Babbitt metal, medium grade....	19.25c.
Babbitt metal, high grade....	58.25c.
Solder, 1/2 and 1/4....	30.75c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible....	7.12 1/2c.	7.87 1/2c.
Copper, hvy. and wire....	7.00c.	7.50c.
Copper, light and bottoms....	6.00c.	6.50c.
Brass, heavy....	4.00c.	4.62 1/2c.
Brass, light....	3.25c.	4.00c.
Hvy. machine composition....	6.00c.	6.50c.
No. 1 yel. brass turnings....	5.12 1/2c.	5.62 1/2c.
No. 1 red brass or compos. turnings....	5.62 1/2c.	6.12 1/2c.
Lead, heavy....	2.50c.	3.87 1/2c.
Zinc....	2.50c.	2.87 1/2c.
Cast aluminum....	12.12 1/2c.	13.25c.
Sheet aluminum....	13.25c.	14.75c.

Save Money on Cutting

Measure your cutting time in seconds—one piece right after another regardless of shape, size or kind of material. No waiting to clamp the pieces or change any attachments—just slide it on the table and cut. The cuts are perfectly straight and the fibre of the metal is not distorted.

Costs are also quickly reduced. Surveys show this method is not only the fastest but also the cheapest way to cut steel. Check up—let us show you what Ryerson-Kling Friction Saws are doing for others.

Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Boston, Cleveland, Buffalo, Philadelphia, Jersey City.

RYERSON-KLING FRICTION SAWS



No. 4 Saw. Ryerson-Kling Friction Saws are built in eight standard sizes.

Write for Bulletin 25B

Activities Bearing on Machine Tool Distribution

By L. M. WAITE

HERE is some anxiety in machine tool distribution circles over reported offerings and acceptances of domestic orders on terms which in the past have been common to the purchasing policies of Russian agents over a considerable period of time.

There is no question as to the "right" of either the buyer or the seller to determine for himself, acceptable methods of payment under which he will or will not trade. However, we are earnestly reminded that the time is opportune for suggesting that extended terms constitute a form of price cutting which does not measure up in terms of fair competition.

Cases in question at the moment are of the old familiar variety, wherein the prospective purchaser announces that he will buy a reasonably extensive line of new equipment, on terms of a dictated per cent cash, a dictated per cent to be accounted for through reciprocal orders over any elected period of time, but within one year, and the balance to be paid with 12 equal monthly notes (interest 4 per cent liquidating basis).

The existing anxiety is not particularly concerned with the fact that a few acceptances by builders of such terms are reported, but rather refers to the records of industrial history on the psychological effect of this kind of trading by responsible and recognized units of any industry. It is pointed out that there is invariably an immediate and rapid spread in demand for like terms or for discounts which will give to other buyers the supposed advantage gained by preferred buyers who enjoy special terms.

Our distinct industrial flair for team work can well serve to the ultimate advantage of all, through the consistent use of organized effort to effect the broadest possible standardization of terms within the industry, to the end that there may be house cleaning on charges of "unfair competition" from this particular angle.

These suggestions are offered by request and with a definite knowledge that they may cause some increases in blood pressure. However, the real tests of production devices lie in the weighing of

engineering ingenuities, as expressed in assembled mechanisms, and not in either sly or open reversion to "rights" as a defensive order-coralling sales element, sometimes substituting for merit or salesmanship.

During the past 25 years, the trail of machine tool orders, subjected to special terms, has been very definite; has been detrimental to the industry, and has consistently resulted in competitive revisions of one sort and another, generally price, which have not been on a plane with the products of the machine tool industry. The industry has not yet emerged from probability of continued attack on wide political fronts; it still needs friends and above all, it needs that internal cooperation which comes from team work, as against suspicion and dissatisfaction. Particularly is this so, if and when ability to accept long drawn out terms with a minimum of cash, operates to the disadvantage of competitive bidders who may lack in ability to "hold the bag" and who therefore, must resort to other inducements, or step one side.

As organized at present, there is little tendency on the part of corporate heads within the industry to step one side. The cash advantage sought by prospective purchasers under this method of buying is easily determined by the simple process of ascertaining the difference between this type of liquidating and normal discount costs on whatever amount of funds may be required to finance the building and selling of machine tools.

Use of Timken bearings in gas, semi-Diesel and full-Diesel engines is covered in a 12-page bulletin being issued by the Timken Roller Bearing Co., Canton, Ohio. Reduction of operating friction, simplifying of starting in cold weather, and elimination of piston and cylinder wear by assuring accurate crankshaft alignment under loads are advantages listed. Typical assemblies for single and double-cylinder engines are shown, and a generous number of tables of recommended bearings for engines of various types, cylinder sizes and explosion pressures is included. Typical closures and bearing adjustments are also illustrated and discussed in the bulletin, which is entitled "Application of Timken Tapered Roller Bearings on Engine Crankshafts."

Cast Iron Pipe

Boston has closed bids on 1850 tons of 16, 20 and 24-in. pipe. Warren Foundry & Pipe Corp. is low bidder.

North Reading, Mass., has placed 1500 tons of 6 to 12-in. with United States Pipe & Foundry Co.

Salem, Va., plans 2, 4 and 6-in. for water system; also pumping station and other waterworks installation. Fund of \$25,000 is being arranged.

Gothenburg, Va., closes bids Dec. 21 for pipe for water system and elevated steel tank and tower. Wiley & Wilson, Peoples' Bank Building, Lynchburg, Va., are consulting engineers.

Fort Gay, W. Va., plans pipe lines for water system. Fund of \$36,300 has been secured through Federal aid for this and other waterworks installation.

Purchase Division, Bureau of Supply, Treasury Department, Washington, closes bids Dec. 26 for cast iron pipe and fittings, galvanized pipe fittings, valves, etc., for Fort Stanton, N. M. (Proposal 1848-SP).

Greenbrier, Tenn., has authorized bond issue for \$23,000 for pipe lines for water system and other waterworks installation. Freeland, Roberts & Co., Nashville, Tenn., are consulting engineers.

Wake Forest, N. C., closes bids Dec. 28 for 350 tons for water system; also for other waterworks installation. William M. Platt, Durham, N. C., is consulting engineer.

Butler, Ga., plans pipe lines for water system. Financing is being arranged.

Ishpeming, Mich., has placed contract for 35,500 ft. of 6 to 14-in. class A water mains with L. W. Brumm, Marquette, Mich.

Marquette, Mich., has placed 1016 ft. of 4-in. with United States Pipe & Foundry Co.

Baraboo, Wis., closed bids Dec. 18 on 1500 ft. of 6-in. and 500 ft. of 8-in. water pipe.

Dresser Junction, Wis., plans pipe lines for water system; also other waterworks installation. Cost about \$24,600. P. R. Banister, Hudson, Wis., is consulting engineer.

Tigerton, Wis., has low bid from Chicago Bridge & Iron Works on a 75,000-gal. steel tank on 100-ft. steel tower at \$8,790.

Onamia, Minn., will soon take bids for pipe for water supply and other waterworks installation. Bids recently received have been rejected. Cost about \$25,000. Druar & Milinowski, Globe Building, St. Paul, Minn., are consulting engineers.

DuQuoin, Ill., will open bids Jan. 10 for waterworks improvements, to cost about \$268,000, including high-service pipe line, low service pumps and 200,000 gal. tank and tower. Russell & Axon, St. Louis, are engineers.

Mattoon, Ill., will soon take bids for pipe for water system, replacing number of present mains; also for new water-softening and filtration plant. Cost close to \$100,000. Bonds have been voted. J. J. Woltman, Unity Building, Bloomington, Ill., is consulting engineer.

Clay County District No. 1, Kansas City, Mo., care of L. E. Bates, National Bank Building, North Kansas City, Mo., representative, recently chartered, plans

In unloading an acid tank car Safety comes first, doesn't it?



Free of explosion
hazards no
endangering of
life or property

With Safety assured, time of unloading is the next factor: "the sooner the quicker" — and cheaper.

That's where Duriron Self-Priming Centrifugal Pumps fit into the picture.

Here's an actual case that can be duplicated in your plant:

To unload a tank car by air pressure took about seven hours and required that two men be on duty, watching, all that time.

With a Duriron No. 2ES Centrifugal Pump, a tank car now is unloaded in 1 1/2 hours at the most. And so far as the operation is concerned, no one need watch it.

Now, where do you get off using air?

Send for bulletins

THE DURIIRON COMPANY, Inc.
438 N. Findlay St. Dayton, Ohio

pipe lines for water system in district north of Kansas City, in Clay County. Cost about \$538,100. Financing is being arranged. Henrich-Lowry Engineering Co., 114 West Tenth Street, Kansas City, Mo., is consulting engineer.

Pittsburg, Kan., closes bids Dec. 23 for pipe for water system; also for 20-ton crane for waterworks station, pumping machinery and other waterworks equipment. Former bids were recently rejected. Cost about \$330,000. Black & Veatch, 4706 Broadway, Kansas City, Mo., are consulting engineers.

Los Lunas, N. M., plans pipe lines for water system; also other waterworks installation, including elevated tank and tower, and pumping unit. Fund of \$38,100 has been arranged. New Mexico Engineering Co., Albuquerque, N. M., is consulting engineer.

Eugene, Ore., has awarded 590 tons of 8 to 20-in. to United States Pipe & Foundry Co.

Torrance, Cal., placed 116 tons of Universal pipe with Central Foundry Co.

Huntington Park, Cal., divided 175 tons between American Cast Iron Pipe Co. and National Cast Iron Pipe Co.

South Laguna, Cal., awarded 120 tons of 2 to 6-in. to United States Pipe & Foundry Co.

Sacramento, Cal., has taken bids on 125 tons of 12 and 16-in.

Seattle, Wash., has opened bids on 100 tons of 6, 12 and 16-in.

Cascade Locks, Ore., has rejected bids on 250 tons and will readvertise contract.

Port Orchard, Wash., plans installation of about 19,700 ft. of 4 to 8-in. for water system, replacing existing wood stave pipe. Financing has been arranged through Federal aid. J. H. Pattison, Port Orchard, is engineer.

Fabricated Structural Steel

Lettings in Good Volume—New Projects Slightly Lower

AWARDS of 24,400 tons compare with 18,000 tons last week. Bookings of size include 3390 tons for the Torrance Avenue bridge in Chicago, 2125 tons for a convention hall in Oklahoma City and 1700 tons for the Commonwealth pier in Boston. New projects total 17,150 tons as against 19,350 tons in the previous week and 24,900 tons two weeks ago. The largest new jobs reported are on the Pacific Coast and include 8000 tons for a union passenger station for the Union Terminal Co. at Los Angeles, and 4000 tons for an assembly plant for the General Motors Corp. at Los Angeles. Plate awards of 24,015 tons include 15,000 tons for a liner for the United States Lines. The Commonwealth pier, Boston, will take 2500 tons of bearing piles and 1300 tons of plates. Structural awards for the week follow:

NORTH ATLANTIC STATES

Boston, 1700 tons, Commonwealth pier, to American Bridge Co.

Fitchburg, Mass., 750 tons, high school, to Boston Bridge Works, Inc.

Wells, Me., 145 tons, bridge, to American Bridge Co.

Hudson, N. Y., 175 tons, senior high school, to Belmont Iron Works.

Farmingdale, N. Y., 245 tons, State highway bridge, to Phoenix Bridge Co.

Esopus, N. Y., 410 tons, State highway bridge, to American Bridge Co.

Rensselaer, N. Y., 1060 tons, State highway bridge, to Phoenix Bridge Co.

Genesee County, N. Y., 105 tons, bridge, to Lackawanna Steel Construction Co.

Angola, N. Y., 112 tons, high school, to R. S. McMannus Steel Construction Co.

Vineland, N. J., 300 tons, power plant, to Frank M. Weaver Co.

Baltimore, 175 tons, additions to Rock Hill Printing Co., to Southern Engineering Co.

Baltimore, 1025 tons, State bridge over Guilford Avenue, to American Bridge Co.

SOUTH AND SOUTHWEST

Norfolk & Western Railroad, 640 tons, bridge at Grundy, Va., to Virginia Bridge & Iron Co.

Franklin County, Ky., 980 tons, State highway bridge, to Virginia Bridge & Iron Co.

Chattanooga, Tenn., 1160 tons, buildings for United States Pipe & Foundry Co., to Converse Bridge & Steel Co.

Careyville, Tenn., 345 tons, Cole Creek bridge for Louisville & Nashville Railroad, to Virginia Bridge & Iron Co.

Milton, Va., 235 tons, repairs to Mud River bridge, to Lackawanna Steel Construction Co.

De Soto County, Miss., 220 tons, bridge, to Vincennes Steel Co.

Hancock County, Miss., 150 tons, bridge, to Jones & Laughlin Steel Co.

Bolivar County, Miss., 175 tons, bridge, to Vincennes Steel Co.

Tallahatchie County, Miss., 125 tons, bridge, to Jones & Laughlin Steel Co.

Noxubee County, Miss., 195 tons, bridge, to Austin Brothers Bridge Co.

Chicasaw County, Miss., 110 tons, to Jones & Laughlin Steel Co.

Sharkey County, Miss., 305 tons, bridge, to Virginia Bridge & Iron Co.

Oklahoma City, Okla., 2125 tons, convention hall, to J. B. Klein Iron & Foundry Co.

Tracy, Cal., 175 tons, overhead crossing, to McClintic-Marshall Corp.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Jamaica, N. Y., 2200 tons, building for Sheffield Farms Co.; McClintic-Marshall Co., low bidder.

New York, 1150 tons, Bronx Borough highway; Bethlehem Fabricators, Inc., Bethlehem, Pa., low bidder.

Brentwood, N. Y., 520 tons, Pilgrim State Hospital building.

Washington, 2000 tons, extension to Archives building; McCloskey & Co., Philadelphia, general contractors.

SOUTH AND SOUTHWEST

Louisville, Ky., 4900 tons of structural steel and reinforcing bars, for Louisville & Nashville Railroad; bids to be taken soon.

Yuma, Ariz., 243 tons, tunnel supports on Gila Valley project; all bids returned unopened and contract may not be re-advertised.

State of New Mexico, 700 tons, beam spans.

CENTRAL STATES

Cincinnati, 540 tons, students' building at University of Cincinnati, to Ingalls Iron Works Co.

Barberton, Ohio, 125 tons, cell house for Pittsburgh Plate Glass Co., to Pittsburgh Bridge & Iron Co.

Lawrenceburg, Ind., 260 tons, distillery buildings, to Ingalls Iron Works Co.

Bridgeport, Ind., 405 tons, bridge, to Central States Bridge & Structural Co.

State of Indiana, 100 tons, two bridges, to central States Bridge & Structural Co.

Dallas County, Iowa, 340 tons, miscellaneous spans, to Pittsburgh-Des Moines Steel Co.

Chicago, 3390 tons, Torrance Avenue bridge, to an unnamed bidder.

South Chicago, Ill., 825 tons, ore and coke structural repairs, to American Bridge Co.

Petersburg, N. D., 200 tons, State highway bridge, to Illinois Steel Bridge Co.

Pike County, Mo., 205 tons, bridge, to Stupp Brothers Bridge & Iron Co.

St. Louis and Jefferson counties, Mo., 750 tons, highway bridge, to Stupp Brothers Bridge & Iron Co.

State of Nebraska, 1130 tons, five highway bridges, to Omaha Steel Works.

State of Nebraska, 640 tons, highway bridges at Emerson and Aurora, to McClintic-Marshall Corp.

Grand Island, Neb., 425 tons, bridge, to McClintic-Marshall Corp.

WESTERN STATES

Winnemucca, Nev., 114 tons, State undergrade crossing, to an unnamed bidder.

State of Wyoming, 111 tons, bridges in Sheridan and Campbell counties, to unnamed bidders.

Bellingham, Wash., 100 tons, addition to normal school, to Isaacson Iron Works.

Albany, Cal., 485 tons, State overhead crossing, to Moore Dry Dock Co.

Palo Alto, Cal., 120 tons, State overhead crossing, to Moore Dry Dock Co.

Fayetteville, N. C., 110 tons, roof plates and top ring for tank for Gulf Refining Co., to Chattanooga Boiler Works.

FABRICATED PLATES

AWARDS

Boston, 1300 tons, Commonwealth pier, to American Bridge Co.

New York, 4500 tons, three municipal ferries, to United Dry Docks, Inc.

New York, 15,000 tons of plates, shapes and bars, trans-Atlantic liner for United States Lines, to Newport News Shipbuilding & Dry Dock Co.

Maurer, N. J., 1080 tons, three tanks, for Barber Asphalt Co., to Chicago Bridge & Iron Works.

Cleveland, 825 tons, spirally welded 30-in. pipe for city water main, to American Rolling Mill Co.

Long Beach, Cal., 1200 tons, six tanks for city, to Western Pipe & Steel Corp.

NEW PROJECTS

New York, 10,000 tons, two tankers for Socony-Vacuum Oil Co.; Sun Shipbuilding & Dry Dock Co., low bidder.

Niagara Falls, N. Y., 500 tons, municipal water pipe line.

Cincinnati, 250 tons, welded pipe for filtration plant.

SHEET PILING

AWARDS

Boston, 2500 tons, bearing piles for Commonwealth pier, to Carnegie-Illinois Steel Corp.

NEW PROJECTS

Muskegon, Mich., 150 tons, PWA filtration plant substructure; bids taken Dec. 12.

Reinforcing Steel

Awards 15,700 Tons—New Projects 7630 Tons

AWARDS

Boston, 175 tons, Commonwealth pier, to Carnegie-Illinois Steel Corp.

New Brunswick, N. J., 250 tons, sewer, to Industrial Engineering Co., New York.

State of Illinois, 400 tons, bridge, to Calumet Steel Co.

Chicago, 325 tons, Dunning Hospital, to Inland Steel Co.

Los Angeles, 14,527 tons, bars for United States Engineers for flood control work, to Los Angeles Iron & Steel Co.

NEW REINFORCING BAR PROJECTS

Jamaica, N. Y., 300 tons, building for Sheffield Farms.

New York, 800 tons, WPA sewer project in Bronx; Rodgers & Haggerty, New York, low bidder.

Washington, 400 tons, extension to Archives building; general contract to McCloskey & Co., Philadelphia.

Louisville, Ky., 4900 tons, including some structural material for Louisville & Nashville bridge.

Jefferson County, Ky., 2500 tons, State grade crossing elimination.

Massillon, Ohio, 255 tons, sewage treatment works; bids Dec. 20.

Mansfield, Ohio, 345 tons, sewage treatment plant; bids Dec. 19.

Rock Island, Ill., 335 tons, armory.

State of Montana, 335 tons, highway projects in six counties; bids opened.

Denver, 198 tons, flumes on South Boulder Diversion conduit; bids Dec. 21.

San Mateo, Cal., 1417 tons, livestock exposition building; all bids rejected.

San Francisco, 242 tons, Agassiz school; all bids rejected.

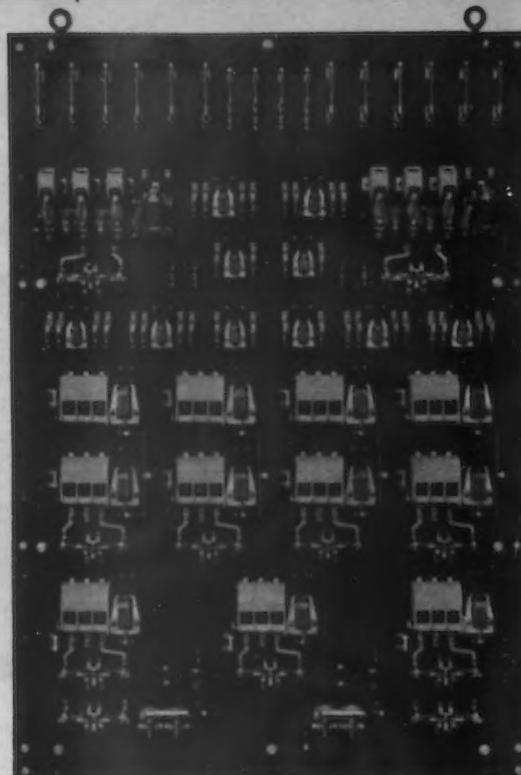
Los Angeles, 777 tons, material for County Purchasing Agent; bids opened.

Los Angeles, 1011 tons, Iron Mountain pumping unit on Colorado River aqueduct project; bids Jan. 14.

State of Oregon, 323 tons, highway projects in seven counties; bids opened.

San Francisco, 192 tons, administration building; bids opened.

CLARK... AUTOMATIC STEEL MILL CONTROL EQUIPMENT



Clark Alternating Current Magnetic Control Panel for complete control of motors operating a Double Pack Furnace for Sheet Mill Work.



THE CLARK CONTROLLER CO.

1146 East 152nd St.

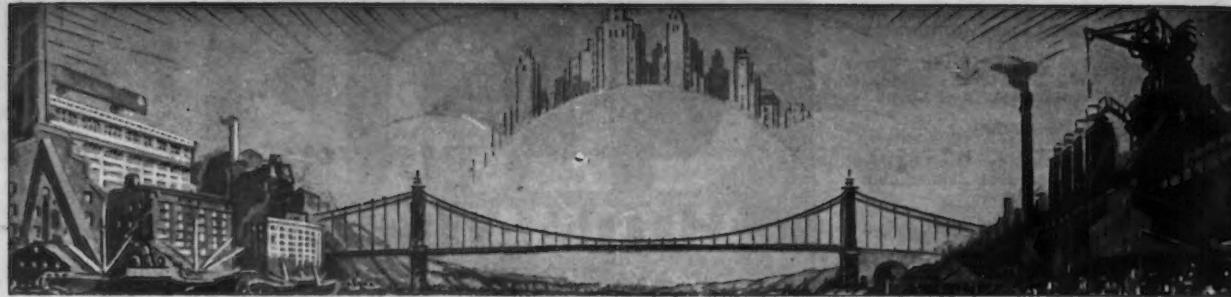
CLEVELAND, OHIO



Weirton Employees Cast Large Vote

MORE than 99 per cent of the employees eligible to vote cast ballots in the annual election of employee representatives concluded Saturday in the Weirton and Clarksburg, W. Va., plants of the Weirton Steel Co.

According to the rules committee a total of 11,250 employees were eligible to vote in last week's election. Of this number 11,158 eligible voters not working regular turns when the polls were opened. More than 95 per cent of the employees off duty voted, while 99.14 per cent of the total number of eligible voters cast ballots.



Plant Expansion and Equipment Buying

Machine Tool Deliveries Far Ahead Of Sales as Buying Interest Slumps

THE usual year-end disinterest on the part of buyers is giving machine tool builders a chance to catch up on their deliveries. Most of them are running at the best rate for December in six years, but deliveries, even on comparatively small tools are extended for six to eight weeks.

The automotive industry has been placing quietly its press requirements for 1937 models and is believed to have spent \$1,500,000

for this purpose in the last month. It now appears likely that the industry's machine tool buying during the first two months of 1936 will be confined to individual orders to strengthen weak spots in assembly lines. Heavier purchases will come in the second quarter.

A large builder has advanced prices on automatic machines approximately 10 per cent and other companies are expected to follow suit.

Street, New York, Capt. J. F. Tomb, U.S.N., superintendent, plans new machine and engineering shops, machinery hall and other mechanical buildings in connection with new training base at abandoned army post at Fort Schuyler, Throgs Neck, Bronx. Several existing buildings will be remodeled and improved in addition to new structures. Work will begin at once. Fund of \$1,752,000 has been secured for project through Federal aid.

Eastern Tool & Mfg. Co., 129 Bloomfield Avenue, Bloomfield, N. J., has leased about 12,000 sq. ft. in local building for new plant, expanding present capacity. Alfred G. Anderson is president.

Commanding Officer, Frankford Arsenal, Philadelphia, asks bids until Dec. 23 for steel forgings (Circular 239), 21,500 steel forgings and 21,800 windshields (Circular 248), 23,800 brass inlet covers (Circular 255); until Dec. 24, for rheostats (Circular 256).

National Gypsum Co., 111 West Washington Street, Chicago, has approved plans for extensions and improvements in branch plant at York, Pa., formerly operated by Universal Gypsum & Lime Co., Chicago, recently acquired. Cost close to \$50,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 27 for gun mount adapters, ejected case containers and ejected link containers for Philadelphia Navy Yard (Schedule 6708).

State Welfare Department, State House, Harrisburg, Pa., plans installation of new water supply plant and system at State Colony, Selinsgrove, Pa., including pump ing machinery and other equipment.

◀ NORTH ATLANTIC ▶

Continental Can Co., 1 Pershing Square, New York, has let general contract to Austin Co., Cleveland, for two-story addition, 120 x 400 ft., to branch plant at Baltimore. Cost close to \$200,000 with equipment.

Scrap Iron Baling Corp., 435-43 Morgan Avenue, Brooklyn, has filed plans for new one-story machine shop. Murray Klein, 65 Court Street, is architect.

American Enka Corp., 271 Church Street, New York, manufacturer of cellulose rayon products, plans extensions and improvements in mill at Enka, near Asheville, N. C., including new equipment and replacements in present machinery. Work will be carried out during 1936. Cost close to \$500,000. A. J. L. Moritz is technical manager in charge.

Glidden Buick Corp., Broadway and 131st Street, New York, representative for Buick automobile, has leased three floors in building at 540 West Fifty-eighth Street, about 40,000 sq. ft., for new branch for storage and distribution, parts, etc.

Central School District, Berlin, N. Y., plans manual training department in new three-story school, for which bids have been asked on general contract. Cost about \$200,000. H. O. Fullerton, 152 Washington Avenue, Albany, N. Y., is architect.

Department of Hospitals, Municipal Building, New York, has taken out permit for two-story power plant on Welfare

Island, 67 x 122 ft. Cost about \$125,000 with equipment. Starrett & Van Vleck, 267 Fifth Avenue, are architects.

Schenley Distillers Corp., 20 West Fortieth Street, New York, has plans for addition to distillery at Lawrenceburg, Ind., to double present capacity. Cost about \$750,000 with machinery. Company will also build new multi-story storage and distributing building at same location, capacity about 100,000 bbl. Cost close to \$300,000 with equipment. Carl J. Kiefer, Schmidt Building, Cincinnati, is vice-president in charge of plant construction.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 27 for fin type steam radiators for Brooklyn, Boston, Norfolk and Mare Island navy yards (Schedule 6704).

Cab Service & Parts Corp., subsidiary of Checker Cab Mfg. Co., 1775 Broadway, New York, manufacturer of taxicabs, has leased four-story building at 311-29 West Sixty-eighth Street, totaling 165,000 sq. ft. floor space, for new factory branch, including parts division, service, maintenance and other departments.

Bagpax, Inc., 220 East Forty-second Street, New York, manufacturer of heavy paper bags for cement, plaster, etc., has work under way for new one-story paper-converting mill in Cullendale district, Camden, Ark., 100 x 300 ft. Cost about \$150,000. Company is subsidiary of International Paper Co., first noted address.

Board of Directors, New York State Merchant Marine Academy, 80 Centre

Bryant Electric Co., Weaver Avenue, Bridgeport, Conn., manufacturer of electric switches, sockets, etc., subsidiary of Westinghouse Electric & Mfg. Co., East Pittsburgh, plans one-story addition, totaling about 20,000 sq. ft. floor space. Cost about \$70,000 with equipment.

Old Colony Wharf & Coal Co., 114 State Street, Boston, has let general contract to Barney Ahlers Construction Co., 101 Park Avenue, New York, for new coal-handling plant and terminal on waterfront at Providence, R. I. Cost about \$45,000 with equipment. George P. Carver Engineering Co., first noted address, is engineer.

Hampden Brewing Co., North Chicopee, Mass., has let general contract to Daniel O'Connell's Sons, Inc., Holyoke, Mass., for three-story addition, 60 x 135 ft., to brewery in Willimansett district. Cost about \$115,000 with equipment. McClinton & Craig, 458 Bridge Street, Springfield, Mass., are architects and engineers.

Board of Education, Brunswick, Me., plans manual training department in new three-story high school, for which bids



SEASONS GREETINGS

TO THE many for whom Wyandotte is an essential part of successful business operation we say, "Merry Christmas, Happy New Year and Many Thanks! We're glad to be associated with you and we hope we'll long continue to merit your confidence."

And to those of you who may not now be enjoying the

efficiency and economy of Wyandotte we also say, "Merry Christmas and Happy New Year!" But we add "The New Year will be happier and more prosperous if you make Wyandotte a part of your business equipment."

It's up to us to prove it, of course. And we will, at your convenience.



THE J. B. FORD COMPANY
WYANDOTTE, MICHIGAN

At Right: Natco multiple spindle drill, Oilgear Fluid Power Feed equipped.

NEW FLUID POWER FEEDS

100 to 600% More
Rapid Traverse Speed

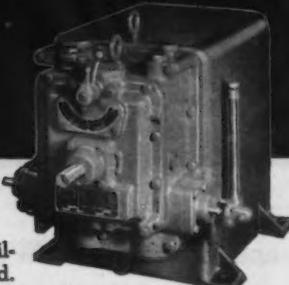
Up to 50% Lower Cost

Compensated

For Speed Variations Under Temperature and Working Conditions

Get Oilgear's
Big New Book.
Free, of Course

Above: A new Oilgear Fluid Power Feed. Note: Flanged mounting, as integral machine part . . . Inside pump, eliminating hazard and bettering appearance . . . Self-contained; auxiliary valves, tubing, etc. are integral with pump . . . Many other exclusive features.



OILGEAR FLUID POWER FEEDS

(B-1264)

have been asked on general contract. Cost \$250,000. Coombs & Harriman, 11 Lisbon Street, Lewiston, Me., are architects.

L. S. Starrett Co., Athol, Mass., manufacturer of mechanics' tools, has acquired indicator manufacturing business of H. A. Lowe Co., 1874 East Sixty-sixth Street, Cleveland, manufacturer of instruments, parts, etc., and will consolidate with business at Athol. Equipment for manufacture will be removed to that location.

Smith Paper, Inc., Lee, Mass., manufacturer of wrapping and other paper stocks, has asked bids on general contract for two one-story and basement additions for machine department and finishing division respectively. Cost over \$50,000 with equipment.

76—THE IRON AGE, December 19, 1935



presses and auxiliary equipment. Cost over \$50,000 with machinery. Company has work under way on addition to mill at Buffalo, for which general contract recently was let to McLain Construction Co., 162 Sanders Road, primarily for a mechanical dryer unit. Cost close to \$40,000.

Division of Purchase, Sales and Traffic, Department of Agriculture, Washington, asks bids until Jan. 3 for six air compressors for Bath, N. Y. (Proposal 3236).

WESTERN PA. DIST.

Hanna Coal Co., Leader Building, Cleveland, plans extensions and improvements in coal mining properties at Willow Grove, near Wheeling, W. Va., including erection of new steel tipple with capacity of 400 tons, mechanical drying plant and other units. Cost over \$100,000 with machinery.

Continental Can Co., 1 Pershing Square, New York, plans addition to branch plant at South Warwood, near Wheeling, W. Va. Cost close to \$50,000 with machinery.

Goldberg Iron & Metal Co., Uniontown, Pa., plans early rebuilding of part of plant recently destroyed by fire. Loss about \$65,000 with conveying, loading and other mechanical-handling equipment.

SOUTH ATLANTIC

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Dec. 28 for hangars with reconditioning and repair facilities, mechanical shops, storehouses and test stands for naval air station, Pensacola, Fla., including air-conditioning and electrical systems (Specification 8082).

Charleston Oil Co., Charleston, S. C., T. Wilbur Thorhill, president, plans new bulk oil storage and distributing plant on 15-acre tract of terminal property at North Charleston, recently acquired. Cost over \$45,000 with steel tanks and other equipment.

Town Council, Wake Forest, N. C., asks bids until Dec. 28 for pumping machinery and accessories, 300,000-gal. elevated steel tank and tower, filter machinery and other equipment for municipal waterworks. William M. Piatt, Durham, N. C., is consulting engineer.

Board of Education, Aiken, S. C., plans manual training department in new two-story high school, for which general contract has just been let to Steifel & Anderson, Aiken. Cost about \$165,000. Willis Irvin, Augusta, Ga., is architect.

OHIO AND INDIANA

Allied Printing & Binding Machinery Inc., 1975 East Sixty-fifth Street, Cleveland, has engaged Edward G. Hoefer, 5005 Euclid Avenue, architect, to prepare plans for one-story addition, 75 x 200 ft., for which bids will be asked on general contract early next year. Cost over \$60,000 with equipment.

Ohio Fuel Gas Co., Sugar Grove, Ohio, plans rebuilding pumping plant recently destroyed by fire. Loss about \$25,000 with equipment.

International Harvester Co., 606 South Michigan Avenue, Chicago, has let general contract to A. G. Samuelson, Inc., Springfield, Ohio, for two-story and basement addition to motor truck division works at Springfield. Cost close to \$30,000 with equipment.

Board of Education, Upper Arlington, Ohio, plans manual training department in new two and three-story and basement high school, for which bids are being asked on general contract. Cost about \$330,000. H. Dwight Smith, 203 East Broad Street, Columbus, Ohio, is architect.

Dunham Co., Berea, Ohio, manufacturer of farm and agricultural machinery and parts, has taken over building at Elyria, Ohio, formerly occupied by Willys-Overland Co., for new plant and will remove to new location and increase capacity.

Contracting Officer, Material Division,

BUFFALO DISTRICT

Automatic Voting Machine Corp., Jones Street and Gifford Avenue, Jamestown, N. Y., has let general contract to Haas Construction Co., Tenth and Monroe Streets, for four-story addition, 40 x 45 ft. Cost over \$60,000 with equipment. R. F. Griffen is general manager.

United States Engineer Office, Buffalo, asks bids until Dec. 23 for 3/4-in. wire rope (Circular 59).

Spencer Kellogg & Sons, Inc., Niagara Square, Buffalo, linseed oil products, soya bean oils, etc., has approved plans for one-story branch crushing plant at Long Beach, Cal., installation to include 24

Now—eliminate annealing

OF WELDED AUSTENITIC CHROMIUM-NICKEL STEEL

with Ferrocolumbium

• Ferrocolumbium provides a convenient and economical means of adding columbium to chromium-nickel steels. Columbium does not readily burn out to a detrimental degree during welding by any method. Hence columbium-bearing 18-8 stainless steel can be used after welding with columbium-bearing welding rod without subsequent annealing.

There is no increased susceptibility to corrosion in or adjacent to the weld seam. The valuable properties of normal 18-8 stainless steel are not impaired.

Columbium inhibits intergranular deterioration of the austenitic chromium-nickel steels when exposed concurrently to high temperatures and chemical corrosion. It makes possible the use of 18-8 stainless steel at temperatures between 1000 deg. F. and 1500 deg. F. without developing intergranular corrosion.

Ferrocolumbium is available from Electro Metallurgical Company. Electro-met Metallurgists will gladly further explain its advantages and assist you in its use. The booklet "Effects of Columbium in Chromium-Nickel Steels" will be sent to you on request. Write for a copy today.

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation

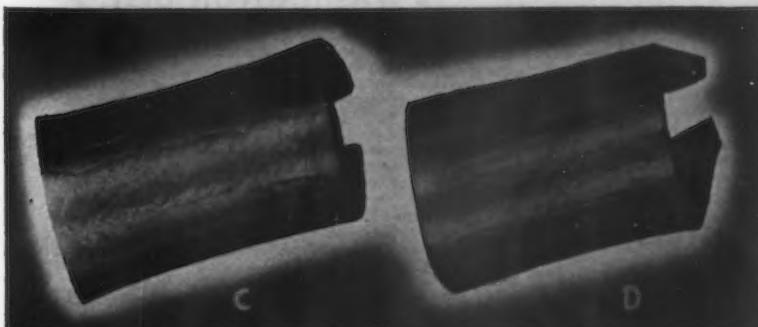
UCC

CARBIDE and CARBON BUILDING
30 EAST 42nd ST., NEW YORK, N.Y.

Electromet Ferro-Alloys & Metals



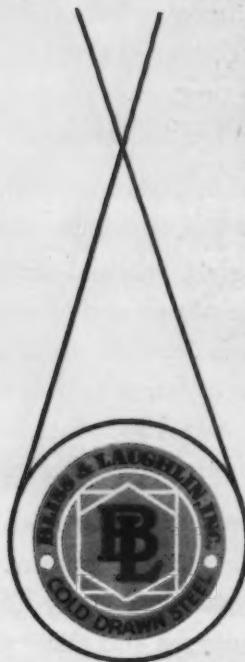
Bending tests on (A) arc-welded normal 18-8 stainless steel and (B) oxy-acetylene-welded normal 18-8 stainless steel after boiling for 400 hours in acidified copper sulphate. Note the severe cracking adjacent to the weld seam, showing intergranular corrosion.



Bending tests on (C) arc-welded columbium-bearing 18-8 stainless steel and (D) oxy-acetylene-welded columbium-bearing 18-8 stainless steel after boiling for 400 hours in acidified copper sulphate. Note the complete absence of cracking, showing absence of intergranular corrosion.

POWER

works without waste on B & L PRECISION SHAFTING



Write for SHAFTING FOLDER No. 4-A for list of sizes and applications

Cold Drawn Bars and Shafting • Ultra-Cut Steel • Special Sections • Alloy Steels

BLISS & LAUGHLIN, INC.
HARVEY, ILL. Sales Offices in all Principal Cities BUFFALO, N.Y.

Air Corps, Wright Field, Dayton, Ohio, asks bids until Dec. 26 for conduit clamps, conduit covers, conduit nuts, conduit unions, etc. (Circular 402), gun mount adapter bolts, bomb rack driving spring assemblies, bomb rack salve and locking bar assemblies, bomb rack tripping bars (Circular 415), self-closing nozzles, oil servicing nozzle strainers, nonferrous metal flexible tips, self-closing gasoline strainer nozzles, gasoline strainers and nonferrous flexible tips (Circular 406); until Dec. 27, cable bushings, hose clamps, tube clamps, clevis, turnbuckle forks, flathead pins, lock pins, turnbuckle assemblies, etc. (Circular 405); until Dec. 30, fuel hose and oil hose (Circular 422).

Noblitt-Sparks Industries, Inc., Columbus, Ind., manufacturer of automobile

heaters, radio equipment, parts, etc., has acquired local plant of Lincoln Chair Co., for branch works, primarily for assembling automobile heater equipment.

◀ SOUTH CENTRAL ▶

United States Pipe & Foundry Co., Chattanooga, Tenn., has let general contract to United Engineers & Constructors, Inc., 1401 Arch Street, Philadelphia, for additions and remodeling and improving existing units. Present No. 1 foundry, one-story, will be extended about 125 ft., making structure 80 x 540 ft.; other new buildings include a one-story machine shop, 60 x 150 ft., equipped with traveling crane;

two-story and one-story pattern shops, 80 x 220 ft., and 34 x 162 ft. respectively; one-story building for coating, cleaning and testing castings, 102 x 250 ft.; two one-story raw material storage units, and smaller structures. Cost over \$600,000 with equipment. Company headquarters are at East Burlington, N. J.

Continental Oil Co., Oklahoma City, Okla., has acquired about 75 acres at Eunice, La., for new gasoline refinery, for which plans will be completed soon. It will include steel tank division for storage and distribution. Cost close to \$100,000 with machinery.

Purchase Division, Board of Supply, Treasury Department, Washington, asks bids until Dec. 26 for electric soldering irons, sheet metal-workers' machines, ammeters, augurs, drills, countersinks, hammers, hatchets, picks, vises, wrenches, shovels, screwdrivers, punches, saws, scrapers, sledges and other tools for station at Narco, Ky. (Proposal 1853-SP).

Board of Directors, St. Walburg Convention, Covington, Ky., will soon take bids for new steam power house, including boiler units, stokers and auxiliary equipment. Howard McClorey, 123 East Sixth Street, is architect and William D. Ehlers, 3523 Pape Avenue, mechanical engineer, both Cincinnati.

◀ MICHIGAN DISTRICT ▶

Acme Mfg. Co., 1645 Howard Street, Detroit, manufacturer of mechanical equipment, dies, parts, etc., has let general contract to Austin Co., Curtis Building, for one-story addition. Cost close to \$30,000 with equipment.

Larson Steel Products Corp., Buchanan, Mich., recently organized, has taken over plant and business of D. S. Larson & Co., operating a chromium plating works. New company will continue in same line, with development of steel forge production as main division of operations. Superstructure has begun on one-story addition for latter branch of output. Cost over \$45,000 with equipment. New company is capitalized at \$125,000 and is headed by D. S. Larson.

Common Council, Blissfield, Mich., plans extensions and improvements in municipal electric light and power plant, including additional equipment. Cost about \$65,000.

Clark Equipment Co., Battle Creek, Mich., will use large part of plant for new line of production covering street car trucks, beginning in January. Automotive department specializing in manufacture of wheels and axles is being removed to branch plant at Buchanan, Mich., to provide necessary space at Battle Creek works, where additional equipment will be installed.

Briggs Mfg. Co., 11631 Mack Avenue, Detroit, manufacturer of steel automobile bodies, has plans for one-story addition to plant on Dix Avenue, for expansion in die division. Cost over \$50,000 with equipment. Giffels & Vallet, Inc., Marquette Building, is architect and engineer.

◀ WASHINGTON DIST. ▶

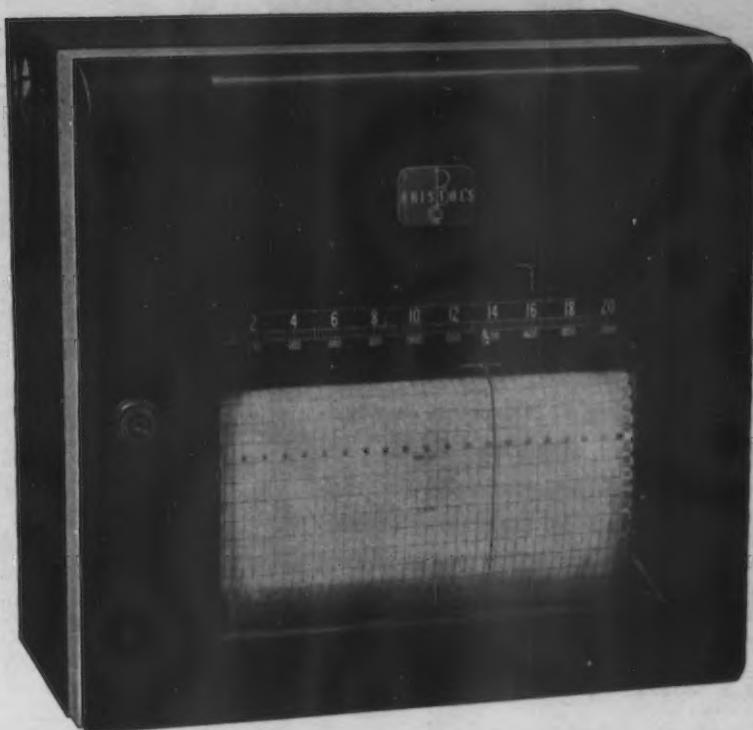
Sherwood Distilleries, Inc., Westminster, Md., has let general contract to G. Walter Tovell, Inc., Eutaw and Monument Streets, Baltimore, for five-story addition, 82 x 156 ft., primarily for storage and distribution. Cost over \$100,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Dec. 28 for buildings at naval ammunition depot and naval submarine base, Coco Solo, Canal Zone, including equipment storage and distribution building, smokeless powder magazines and other units (Specification 8124).

Town Council, Emporia, Va., asks bids until Dec. 23 for pumping machinery and accessories, elevated steel tank and tower, and other mechanical equipment for municipal waterworks. Wiley & Wilson, Richmond, Va., are consulting engineers.

General Purchasing Officer, Panama Canal, Washington, asks bids until Dec.

Industry Acclaims *this fine pyrometer*



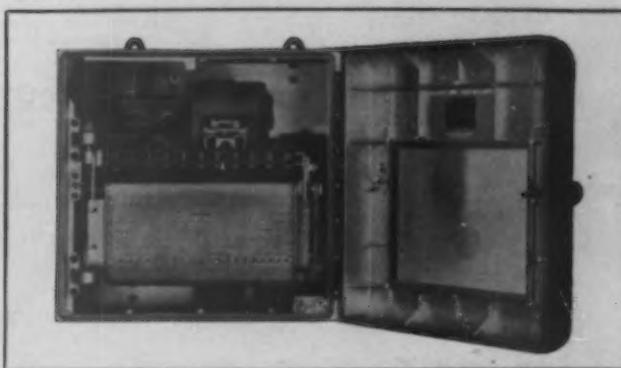
Built by the pioneer makers of Pyrometers, this latest Bristol's sets a new standard in potentiometer design and craftsmanship

Only a mere month or so has elapsed since this new Bristol's Wide-Strip Pyrometer was first announced at the Chicago National Metal Congress in October. Yet according to the ever-increasing number of enthusiastic reports that are coming in, it is the finest pyrometer ever presented to industry! Again Bristol design and craftsmanship have triumphed!

The use of a new principle in the balancing mechanism permits even the smallest deflections of the galvanometer to be measured and recorded. The pen responds promptly. Balance is quickly restored. Changing temperatures are speedily and accurately charted. Thanks to the elimination of back lash, lost motion, irregularities and the uncertainties unavoidable with friction wheels, ratchets and the like, this Bristol's sets a new standard in simplicity.

T H E B R I S T O L C O M P A N Y
Branch Offices in Principal Cities. Canada: The Bristol Co. of Canada, Ltd., Toronto. England: Bristol's Instrument Co., Ltd., London, S.E. 14

There are many features which merit careful appreciation. Besides the unusually wide strip chart, "far vision" indicating scale, heavy duty galvanometer, duplex slide wire, these are fully described in Catalog 1450 mailed on request. Write for a copy.



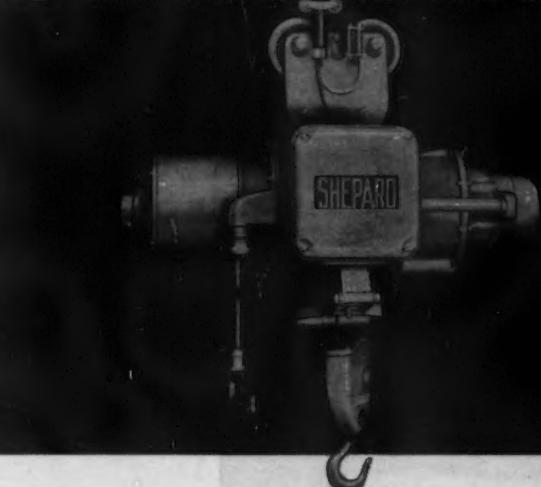
WATERBURY • CONNECTICUT
Branch Offices in Principal Cities. Canada: The Bristol Co. of Canada, Ltd., Toronto. England: Bristol's Instrument Co., Ltd., London, S.E. 14

BRISTOL'S

TRADE MARK REG. U.S. PAT. OFF.

W I D E - S T R I P P O T E N T I O M E T E R P Y R O M E T E R

SHEPARD



ELECTRIC HOISTS

Exclusive features: 1. Balanced Drive, at two points diametrically opposite. 2. Perfect alignment, maintained by all parts rotating around a common axis. 3. Automatic Oil Bath Lubrication. 4. Control by rope, push button, outrig or controller for every hoist. 5. Precision variable speed control for both A.C. and D.C. 6. Variety of speeds, types, lifts and capacities precisely suited to any service. Write for complete data.

SHEPARD NILES CRANE & HOIST CORP.
356 Schuyler Avenue, Montour Falls, N. Y.

26 for one automatic process machine, six pneumatic hoists, pressure and vacuum gages, 10,000 lb. steel track spikes, 6000 lb. steel welding electrodes, manganese bronze welding rods, and other equipment (Schedule 3111).

Purchasing and Contracting Officer. Holabird Quartermaster Depot, Baltimore, asks bids until Jan. 9 for one piston turning and grinding machine, fender iron complete with built-in pressure regulator and throttle (Circular 75).

Bureau of Supplies and Accounts, Navy Department. Washington, asks bids until Dec. 27 for steel flanges (Circular 6694), copper tubing (Schedule 6686), steam, pressure regulating, loading and unloading master control valves (Schedule 6691), one storage-battery truck, with crane of 3000-lb. capacity, and one similar truck without storage battery (Schedule 6698) for Eastern and Western navy yards; 15 motor-driven nibbling machines for Sewall's Point and San Pedro yards (Schedule 6718).

MIDDLE WEST

Wilson Steel & Wire Co., 4840 South Western Avenue, Chicago, has let general contract to Ace Builders, Inc., 4809 Kentucky Avenue, for one-story addition, 100 x 125 ft. Cost about \$60,000 with equipment. Fred A. Fielder, 118 East Twenty-sixth Street, is architect.

Edison General Electric Appliance Co., 5660 Taylor Street, Chicago, an interest of General Electric Co., has filed plans for one-story addition, 100 x 110 ft., for storage and distribution.

W. A. Laidlaw Wire Co., Peoria, Ill., and Keystone Steel & Wire Co., same place,

have acquired through company officials plant and business of Mabey Electric & Mfg. Co., 968 Fort Wayne Avenue, Indianapolis, manufacturer of electric heating devices and equipment, and will operate as an affiliated interest.

Schutz & Hilgers Jordan Brewery, Inc., Jordan, Minn., has let general contract to Schmidt Brothers, Belle Blaine, Minn., for one and two-story addition, primarily for a mechanical-bottling works. Cost close to \$40,000 with equipment. Wesley G. Wells, 1455 Edmund Street, St. Paul, Minn., is architect.

United States Engineer Office, Fort Peck, Mont., asks bids until Dec. 23 for four motor-driven centrifugal pumps for water service (Circular 223), one set alloy back-head outer liners and two alloy front-head liners (Circular 221).

Roberts & Oake, Inc., West Forty-fifth Street and South Racine Avenue, Chicago, food packer, plans new steam power plant at packing house at Marshalltown, Iowa. Cost about \$50,000 with boilers, pumps and other equipment.

Joseph Schlitz Brewing Co., Milwaukee, plans extensions and improvements, including several new buildings for increased capacity. Complete modernization will be carried out in present plant. Cost about \$1,000,000.

Orth Mfg. Co., 3025 West Atkinson Avenue, Milwaukee, manufacturer of automobile equipment and accessories, has moved its factory and office to Cedarburg, Wis., where it has taken long-term lease on shop to triple floorspace.

Wisconsin Hydro Electric Gas Co., Menomonie, Wis., is building two-story addition to maintenance and repair shop, to cost \$20,000 with equipment. V. W. Packard is superintendent.

SOUTHWEST

Shell Oil Co., Shell Building, St. Louis, has approved plans for new oil refinery at Dominguez, Los Angeles. Project will include steel tank division for storage and distribution. Cost close to \$1,000,000 with equipment.

Board of Education. Ninth and Harrison Streets, Topeka, Kan., plans manual training department in new two-story high school at East Topeka, for which bids have been asked on general contract. Cost about \$380,000. Cuthbert & Suehrk, 735 Kansas Avenue, are architects. Frank Williamson, National Bank of Topeka Building, is mechanical engineer.

City Council. Marshall, Mo., is arranging bond issue of \$150,000 for extensions and improvements in municipal electric light and power plant, including new equipment. Henrici-Lowry Engineering Co., 114 West Tenth Street, Kansas City, Mo., is consulting engineer.

Common Council. Galena, Mo., will soon take bids for deep well centrifugal pumping machinery and auxiliary equipment, 65,000-gal. elevated steel tank and tower, and other equipment for municipal waterworks. Fund of \$35,000 has been arranged.

Board of Sumner County Commissioners. Wellington, Kan., plans new engineering and mechanical shops for County service, to replace units recently destroyed by fire. Cost over \$40,000 with equipment.

Cardin Mining & Milling Co., Picher, Okla., has begun construction of new zinc mill on mining properties of Admiralty Zinc Co., near Douthat, Okla., for handling about 100 tons of crude ore per hr. Cost over \$250,000 with machinery.

Roeglin Provision Co., 1009 East Commerce Street, San Antonio, Tex., meat packer, will soon take bids on general contract for new one-story packing plant, 35 x 110 ft. Cost over \$50,000 with equipment. Marvin Eickenroth, Maverick Building, is architect; L. D. Royer, Smith-Young Tower Building, is consulting engineer.

Charles A. Zilker., 519 West Ashley Place, San Antonio, Tex., is head of project to erect a new brewery at Orange and Cochran Streets, where site has been acquired. Cost about \$150,000 with equipment. Company will be organized to carry out project. Bids will be asked soon.

PACIFIC COAST

Pacific Coast Steel Corp., East Slauson Avenue, Vernon, Los Angeles, plans extensions and improvements in two-story storage and distributing buildings at 6900 Stanford Avenue, including new crane runway and other facilities. Cost close to \$35,000 with equipment.

Pacific Steel Foundry Co., Eighteenth and Treat Streets, San Francisco, plans rebuilding part of plant recently destroyed by fire. Cost close to \$50,000 with equipment.

Bureau of Supplies and Accounts, Navy Department. Washington, asks bids until Dec. 27 for 1450 threaded globe valves and 1720 bronze steam and water valves for Mare Island Navy Yard (Schedule 6739), electric cable for Mare Island and Puget Sound yards (Schedule 6720), Diesel engine-generator sets, switchboards and spare parts for Mare Island, Puget Sound and other navy yards (Schedule 6690), two motor-driven pipe-threading machines for Puget Sound yard (Schedule 6714).

La Verne Cooperative Citrus Association. La Verne, Cal., has let general contract to H. M. Hanawalt, 2151 D Street, for one-story additions to fruit-packing plant. Cost about \$50,000 with conveyors, loaders and other mechanical-handling equipment. C. I. Cartwright is general manager.

St. Regis Kraft Co., Tacoma, Wash., manufacturer of kraft paper stocks, plans extensions and improvements in mill, for conversion into new bleached paper plant. Cost over \$75,000 with machinery. W. W. Griffith is general manager. Company is a subsidiary of St. Regis Paper Co., New York.

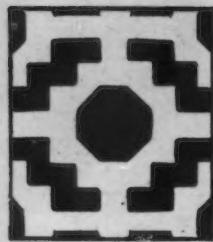
BUILT BY **MORGAN**
Engineering » »

BUILDING large machinery for other manufacturers, MORGAN Engineering Company itself must have still larger machinery for the job. A trip through the heavy machine shops and assembly rooms in our plants will assure you that whatever the size of machine you need, MORGAN has facilities for its construction. Here is a 1000-ton Hydraulic Flanging Press built by MORGAN for Lukens Steel Company, pressing brake drums for oil well drilling equipment in Lukens' Flanging Department. The drums produced on this press measure 51 $\frac{1}{2}$ ' I. D. x 10 $\frac{1}{2}$ ' deep x 1 $\frac{1}{2}$ ' thick. Lukens operates a battery of MORGAN presses.

THE MORGAN ENGINEERING CO., Alliance, Ohio
Pittsburgh, 1420 Oliver Bldg. New York, 11 W. 42nd Street
*Designers and Manufacturers of ELECTRIC TRAVELING CRANES
ROLLING MILL MACHINERY • SPECIAL MACHINERY FOR STEEL MILLS*



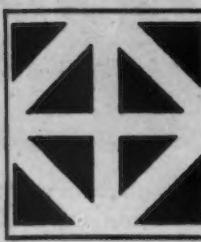
WICKWIRE SPENCER perforated metals



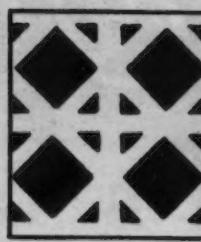
LACECANE



CIRCANE

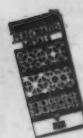


CROSCANE



WISCANE

The Clinton Works of the Wickwire Spencer Steel Company was the first plant in America to produce perforated metal. It has kept apace with each new development in the art of perforating metals and offers today, a service that is unique in its completeness. A few of the newer designs are shown in the new circular "Decorative Perforated Metals." You will find it of value to you.



WICKWIRE SPENCER STEEL CO.

37 East 42nd St., New York City

Worcester

Buffalo

Chicago

San Francisco

Send for this new Perforated Metals Folder

Division of Purchase, Sales and Traffic, Department of Agriculture, Washington, asks bids until Dec. 27 for four air compressors for Caliente, Nev., and Albuquerque, N. M. (Proposal 3195).

Analy Union High School District, Sebastopol, Cal., has plans for one-story manual training shop, for which superstructure will begin soon. Cost about \$30,000. Louis S. Stone and Henry C. Smith, 785 Market Street, San Francisco, are architects.

Pioneer Sea Foods Co., Eyak, Alaska, plans rebuilding food packing plant and cannery, including storage and distributing building, recently destroyed by fire. Loss about \$175,000 with equipment.

◀ FOREIGN ▶

Colonial Sugar Refinery Co., Ltd., Sydney, Australia, plans new mill on tract at North Queensland, recently acquired for production of fiber board from cane sugar waste. Plant will comprise several one-story units, with power house, machine shop and other mechanical departments. It is scheduled for completion next summer. Cost over \$700,000 with machinery.

Thomas Hedley & Co., Ltd., Newcastle-on-Tyne, England, manufacturer of soaps, washing powders, etc., has plans for additions on adjoining site. Cost close to \$200,000 with equipment.

Vacuum Oil Co., S. I. A., Genoa, Italy, an interest of Socony-Vacuum Oil Co., Inc., New York, has plans for new oil refinery at Naples, adjoining an existing small refinery at that place, previously owned by Petrofina Co. of Belgium. Cost 75,000,000 lire (about \$6,075,000 with equipment).

Cutler-Hammer, Inc., Milwaukee, manufacturer of electrical controlling devices, will pay a bonus of 3 per cent of 1935 earnings to all shop and office employees at the close of this year. The number of beneficiaries is estimated at 2500. The first stockholders' dividend since 1930, amounting to 25c. a share, has also been declared.

British in Row Over Steel Quotations

NEGOTIATIONS are going on among Britain's leading automobile manufacturers and steel producers following Lord Nuffield's recent declaration that the steel industry was taking advantage of the duties on imported steel to charge prices one-third higher than those of foreign competitors on sales to the automotive industry. Incensed by the fact that he had helped the steel producers in their fight for duties, Lord Nuffield has threatened to set up his own steel works and produce all the material required by the Morris automobile works. Lord Nuffield's threat was followed by the decision of the Austin Motor Co. to proceed with the establishment of its own steel works.

So delicate are the negotiations that the Austin concern, second only in size to the Morris company, refuses at this stage to discuss its plans. However, it is known that the Austin company has in mind the construction of a steel plant capable of turning out 100,000 tons annually.

Following Lord Nuffield's statement there came an announcement from the steel trade that a reply would be made in the form of a statement from the British Iron and Steel Federation. This is now being formulated and will contain

a very full explanation of why steel prices have been raised.

A leading automobile manufacturer has summed up the present situation as follows: "The automobile industry will not consider erecting its own steel plants unless the steel industry forces its hand. It is not possible to say more at the moment."

The view of the steel industry has been given by a leading producer thus: "Whatever the statements circulating, it can be taken as certain that we are cooperating with such big consumers as the automobile industry, and intend to continue that cooperation."

Surplus Freight Cars Decline in October

ON Oct. 31 Class I railroads had 208,158 surplus freight cars in good repair and immediately available for service, according to the Association of American Railroads.

This was a decrease of 12,041 cars compared with the number of such cars on Oct. 14.

Surplus coal cars on Oct. 31 totaled 47,728, a decrease of 1555 cars below the previous period, while surplus box cars totaled 125,339, a decrease of 86 cars compared with Oct. 14.

Reports also showed 19,990 surplus stock cars, an increase of 1646 compared with Oct. 14, while surplus refrigerator cars totaled 5652 or a decrease of 944 for the same period.

On Nov. 1 Class I railroads had 273,125 freight cars in need of repairs or 15.0 per cent of the number on line, according to the association.

This was a decrease of 11,302 cars compared with the number in need of such repairs on Oct. 1, at which time there were 284,427 or 15.5 per cent.

Freight cars in need of heavy repairs on Nov. 1 totaled 226,431 or 12.4 per cent, a decrease of 4796 cars compared with the number in need of such repairs on Oct. 1, while freight cars in need of light repairs totaled 46,694 or 2.6 per cent, a decrease of 6606 compared with Oct. 1.

Locomotives in need of classified repairs on Nov. 1 totaled 10,187 or 22.3 per cent of the number on line. This was a decrease of 148 compared with the number in need of such repairs on Oct. 1, at which time there were 10,335 or 22.6 per cent.

Class I railroads on Nov. 1 had 3030 serviceable locomotives in storage compared with 3815 on Oct. 1.



THE fact that 85% of all continuous hot strip mills equipped with roller bearings are lubricated by Penola is striking proof of the high performance of Penola lubricants.

When continuous hot strip mills first appeared, the extreme pressures involved called for a new lubricant of much higher film strength than any then in use. In addition, the fine finishes on the costly roller bearings had to be safeguarded against pitting and corrosion. Ladex Lubricant was pioneered and developed by Penola expressly to meet these demands.

Today, with some hot mills rolling wide strip of almost incredible thinness, Ladex is even more essential. It assures the proper roller bearing

lubrication that prevents wear, maintains the rolls in perfect alignment and thus assures continuously accurate material.

Next time you have a lubrication problem, talk it over with a Penola engineer. He'll save you money and valuable time. Make it a rule to rely on Penola, leader in steel mill lubrication for half a century.

PENOLA LUBRICANTS



PENOLA INC.
Formerly
PENNSYLVANIA LUBRICATING CO.
PITTSBURGH, PA.

Grease works operated at
Baltimore, Md.
Baton Rouge, La. - Eldorado, Kan. - Pittsburgh, Pa.

1885 - LUBRICATION FOR THE STEEL INDUSTRY - 1935

THE IRON AGE, December 19, 1935—83

The NEW **WELDIT** MODEL A *Automatic*
WELDING TORCH
with GAS SAVER in Handle



The Control of Cupola Operation

(CONTINUED FROM PAGE 23)

able desulphurizer of the metal. A combination of one part of soda ash and ten parts by weight of limestone is sometimes used as a cupola flux.

The Air Supply

The operation of the cupola furnace requires a continuous supply of fuel and air. The volumes of air required to burn 1 lb. of coke under different combustion conditions have been derived and are given in Table I. Also, the method of computing the weight of one coke charge has been established, and the weights of the coke charges for cupolas of different sizes are given in Table III. From these values, the volume of the air required for the combustion of one coke charge can be readily found.

The amounts of air which will burn one coke charge under combustion condition *F* in cupolas of different sizes are given in Table IV. These values do not take into account any losses in the blast pipe or wind belt.

It is proposed that the rate of burning the coke and melting the metal in a cupola be computed on the basis of the units used in charging the solid materials. This in turn will fix the rate of supplying the air. Different rates of melting can be obtained by changing the air supply to a cupola. In Table IV, the melting rates for cupolas of different sizes are given on the basis of burning one coke charge and melting one metal charge in 4, 5, and 6 min.

One of the factors which should

OPERATION OF A 54-IN. CUPOLA

	Combustion Rate		
	4 Min.	5 Min.	6 Min.
Volume of air, cu. ft. per min.....	5,381	4,304	3,587
Average operating air pressure, oz. per sq. in.	20	13	9
Melting rate, tons per hour.....	14.2	11.4	9.5
Horsepower required.....	32	16	10
Horsepower per ton per hour.....	2.3	1.4	1.1

influence the choice of the melting rate is the cost of supplying air to the cupola. When the efficiencies of the mechanical equipment are disregarded, the horsepower for supplying air is obtained by multiplying the volume of the air in cubic feet per minute by the pressure in ounces per square inch and again by the factor 0.0003. Since the pressure increases with the volume of the air delivered to a cupola, the power increases more rapidly than the melting rate. The data given below apply to the operation of a 54-in. cupola.

It has been shown that the cost of power is less for the slower melting rate; however, other conditions may offset this advantage. The requirements for molten metal from a single melting unit may make it necessary to use more rapid melting. A 72-in. cupola has been operated to melt 30 tons of iron per hour, which is equivalent to a rate of 3 min. for burning one coke charge and melting one metal charge. The practice which is generally preferred is to use a combustion rate of 5 min. for each coke charge.

Any changes in the melting rate of a cupola must be accompanied by corrections in the height of the coke bed, if favorable combustion conditions are to be maintained. When the melting rate is decreased by supplying less air, the height of the coke bed is automatically lowered as a result of the formation of carbon monoxide gas. On the other hand, when the air supply is increased, the pressure in the wind belt and hence the velocity of the gases in the coke bed are increased. This causes the region containing free oxygen in the cupola to be raised and makes a higher coke bed necessary in order to avoid the oxidation of the metal charges. The only method of raising the height of the coke bed after the operation of the cupola has been started is to supply extra coke to the subsequent charges. Therefore, it is not good practice to increase the air supply without providing in advance the extra coke needed to build up the bed.

Penetration and Distribution of the Air

The actual conditions of the penetration and distribution of the air supplied to the cupola furnace are often misunderstood. Many designs of special tuyeres have been



Nicholson Files have teeth that take hold of metal instantly . . . teeth that are made to meet conditions as they actually exist in industrial plants.

Nicholson Files give longer service; they speed up filing operations; they make a good mechanic even more valuable to his employers. Every Nicholson File is made exactly like all other Nicholson Files of its type . . . alike in steel, teeth, shape and appearance.

These things — fast cutting, durability and uniform quality far beyond what you might reasonably expect are what we mean when we say Nicholson Files are "Highest Quality." At hardware wholesalers and mill supply dealers. Nicholson File Company, Providence, R. I., U. S. A.

Genuine

**NICHOLSON
FILES**

A FILE

FOR EVERY PURPOSE

THE
STARTING
POINT of



FORGINGS
CARBON-ALLOY
AND SPECIAL
BASIC ELECTRIC
STEELS

NATIONAL FORGE AND ORDNANCE CO.

IRVINE, WARREN COUNTY, PENNA., U.S.A.



COMPLETE control of all processing from selection of the melting charge to the finished condition is the N. F. & O. guarantee of quality in forgings furnished to your specifications—Smooth Forged, Hollow Bored, Rough or Finish Machined.

proposed for obtaining greater penetration of the air toward the center of the cupola. Since the coke bed forms an ideal baffle to the directional penetration of the air stream, there is no possibility of forcing the air in a given direction by restricted areas or by special shapes of tuyeres. It has also been assumed that air at low pressure would travel up the lining of the cupola and would not penetrate the bed coke.

The following investigation was carried out to determine the actual distribution of the air within the coke bed of a cupola. Twenty-eight copper tubes $\frac{1}{4}$ in. in diameter were placed in the coke bed of a 32-in. cupola with their ends at seven equidistant positions across the bed and at levels of 14, 20, 26, and 32 in. above the top of the tuyeres. These tubes extended to the outside of the cupola and were connected to water manometers. The entire coke bed containing pieces of coke averaging 3 in. in size was then built up to a height of 48 in. above the top of the tuyeres. A positive-displacement blower driven by a variable-speed motor was used to supply air to the cupola. Four rectangular tuyeres with a total inside area of 95 sq. in. were provided. At a pressure of only 4 oz. per square inch in the wind belt, the pres-

sures across each level of the coke bed were nearly the same with a tendency for slightly higher pressures in the center of the cupola at the lower levels where the measurements were made.

Materials were then charged into the cupola on top of the coke to increase the resistance to the flow of the air. When the pressure in the wind belt was raised to 10 oz. per square inch, the pressures across the bed at each level were practically constant with slightly increased pressures at the center of the cupola. These measurements were made with the air and coke bed at room temperature. Under normal operation of the cupola, other conditions such as the expansion of the gases by heat and the increase in volume due to the formation of carbon monoxide gas will probably influence the distribution of the gases to some extent. However, it could reasonably be expected that the distribution of the gases across the bed of the cupola above the tuyeres when the coke is burning is fairly uniform. The construction of the coke bed is such as to favor the distribution of the air in the cupola except when careless charging or insufficient slagging causes the obstruction of the gas passages through the bed. On the basis of the results obtained from the investiga-

tion described above, there is little prospect of any advantage to be gained in the distribution of the air by restricting the area of the cupola above the tuyeres or by reducing the size of the tuyere openings.

Manufacture of
Copper Tubing

(CONTINUED FROM PAGE 27)

at the rate of about 4000 cu. ft. an hour, which is sufficient to develop a slight pressure and thereby prevent the entrance of outside air.

Each coil, before entering the furnace, has its interior purged by this same gas, admitted under a pressure of approximately 25 lb. per sq. in. Thus there is no possibility of oxidation either inside or outside the tube during the anneal. Straight lengths of pipe are self-purged, due to the stack effect and the excess pressure inside the furnace. Furnace heating elements are located above and below the alloy mesh belt which carries the tubing through the furnace. A series of fans throughout the heating chamber of the unit assures uniform temperature distribution and more rapid heat transfer.

After emerging from the discharge end of the furnace, the tubes are cooled to avoid oxidation or tarnishing. This is accomplished by means of a cooling zone, roughly twice the length of the furnace proper. This zone is also equipped with fans to accelerate cooling. The reduction in this zone is to approximately room temperature.

All of the tubing used to carry refrigerant must be entirely free of moisture, or, in other words, dehydrated. Tubing emerging from the bright annealing furnace is entirely free of moisture both inside and out. The ends, therefore, are immediately flattened and sealed with solder in order to maintain this dehydrated condition inside the tube.

Blaw-Knox Co., Pittsburgh, has declared special dividend of 10c. a share on its outstanding no-par value capital stock, payable Jan. 2, to stockholders of record Dec. 14. Last dividend paid by company was in March, 1932, which was 12½c. a share.

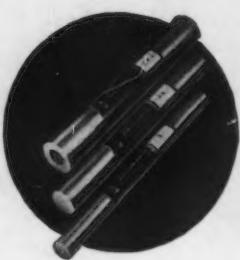
Standardized

Bronze

Bearings



Cored
and
Solid
Bronze
Bars



Bunting
Industrial
Babbitt

UNLESS you are fully acquainted with the money-, time- and labor-saving advantages conferred by the three above products upon all mechanical production and maintenance operations, you should at once write for catalog data or ask the Bunting mill supply wholesaler in your market.

THE BUNTING BRASS & BRONZE COMPANY, TOLEDO, OHIO

Branches and Warehouses in All Principal Cities

BUNTING *Quality*
BRONZE BUSHINGS • BEARINGS
MACHINED AND CENTERED BRONZE BARS
ANTI-FRICTION METAL

JUST BETWEEN US TWO

Tempted

WHEN a man finds it necessary to keep reminding you of his uprightness you do well to keep your hand on your watch.

So we hesitate to brag about our ethics for fear you will get ideas. As a matter of fact, we are rarely conscious that we have ethics, getting so few attractive invitations to stray off the path of publishing rectitude.

A bribe was offered us last week. A Western manufacturer of an unepochal development offered a two-year subscription in exchange for what he called "a write-up."

We hopped enthusiastically on the opportunity to air our ethics, sending a reply that fairly dripped with righteousness—"Is it news?" is our editors' sole criterion. They will consider the item solely on its merits. If found unworthy, even a century subscription would sway them less than a 100 lb. waltzer sways a square-jawed 285 lb. maiden lady."

"And if," we concluded, "you decide to subscribe on that basis, well and good." We felt nobler than Galahad, but he didn't bother to reply.

Pome *A long Bronx cheer and ripe raspberry
To him who says sub-sid-u-ary.*

Down She Goes

THE discovery, through light wave measurement, that a housefly at the end of a $\frac{1}{2}$ -in. steel bar, one foot long, causes the bar to bend one-millionth of an inch, explains the mournful droop in the left side of our front fender. Apparently a fat horsefly sat on it.

Open-Eyed Sales Manager

THE other day the sales manager of a small company in the industry called for an advertising rate card, and said:

"I see Iron Age practically every place I call for business, so I believe it will pay us to advertise in it."

Tie that observation to this letter from a manufacturer of electrical products and you have the reason why The Iron Age's front and back covers are steadily moving in opposite directions:

"Our president frequently takes The Iron Age home with him and brings copies back with the corners of many pages turned down, advertisements of new and interesting products marked to be inquired into. . . ."

Head Down, Feet Up

ACCORDING to Colgate's indefatigable Dr. Laird, you think 7.1 per cent faster and 14.1 per cent more accurately with your feet higher than your head. It seems that the conventional attitude of feet on floor induces a mild but perpetual case of cerebral anemia.

This is probably the reason why the most brilliant ideas, which are promptly forgotten the next morning, occur just before snoring begins.

Of course, by this reasoning the sloth, which hangs by its feet, should be the brightest instead of the dumbest of animals, but that would interfere with the theory, so Dr. Laird does not go into that.

If you want to test it out, put your feet on top of the piano and try this problem sent in by H. A. Coleman, Whitman, Mass.:

"A machinist bores a 2-in. dia. hole in a piece of steel. He then fills this with lead and bores another hole of the same diameter at right angles to the first and in the same plane. Both holes extend entirely through the steel. How many cubic inches of lead does he remove in the second boring?"

In Union . . .

THE gregariousness of American business awes us. No matter how restricted the field, its members herd like grains of puffed rice in a bowl of milk. We understand there is in this country just one woman horse-shoer. We will be surprised if she hasn't formed the Woman's Horse-Shoer Association.

Look at these names picked from the Department of Commerce's trade association list:

Hog Ring & Ringer Mfrs. Assn.
Aromatic Red Cedar Closet Lining Assn.
Assn. of Mfrs. of Upward-Acting Doors
Bogus Wrapping & Packing Assn.
National Assn. of Coated Shoe Tape Mfrs.
Lead Head Nail Mfrs. Assn.
Mechanical Egg Beater Institute
National Assn. of Fluted Cup, Pan Liner & Lace Paper Mfrs.
National Assn. of Fly Swatter Mfrs.
National Assn. of Mop Stick Mfrs.
National Dog Food Mfrs. Assn.
National Sausage Casing Dealers Assn.
National Singletree Institute
National Spat Mfrs. Assn.

Merry Christmas!

—A.H.D.

Fabricated Structural Steel

Lettings in Good Volume—New Projects Slightly Lower

AWARDS of 24,400 tons compare with 18,000 tons last week. Bookings of size include 3390 tons for the Torrance Avenue bridge in Chicago, 2125 tons for a convention hall in Oklahoma City and 1700 tons for the Commonwealth pier in Boston. New projects total 17,150 tons as against 19,350 tons in the previous week and 24,900 tons two weeks ago. The largest new jobs reported are on the Pacific Coast and include 8000 tons for a union passenger station for the Union Terminal Co. at Los Angeles, and 4000 tons for an assembly plant for the General Motors Corp. at Los Angeles. Plate awards of 24,015 tons include 15,000 tons for a liner for the United States Lines. The Commonwealth pier, Boston, will take 2500 tons of bearing piles and 1300 tons of plates. Structural awards for the week follow:

NORTH ATLANTIC STATES

Boston, 1700 tons, Commonwealth pier, to American Bridge Co.

Fitchburg, Mass., 750 tons, high school, to Boston Bridge Works, Inc.

Wells, Me., 145 tons, bridge, to American Bridge Co.

Hudson, N. Y., 175 tons, senior high school, to Belmont Iron Works.

Farmingdale, N. Y., 245 tons, State highway bridge, to Phoenix Bridge Co.

Esopus, N. Y., 410 tons, State highway bridge, to American Bridge Co.

Rensselaer, N. Y., 1060 tons, State highway bridge, to Phoenix Bridge Co.

Genesee County, N. Y., 105 tons, bridge, to Lackawanna Steel Construction Co.

Angola, N. Y., 112 tons, high school, to R. S. McMannus Steel Construction Co.

Vineland, N. J., 300 tons, power plant, to Frank M. Weaver Co.

Baltimore, 175 tons, additions to Rock Hill Printing Co., to Southern Engineering Co.

Baltimore, 1025 tons, State bridge over Guilford Avenue, to American Bridge Co.

SOUTH AND SOUTHWEST

Norfolk & Western Railroad, 640 tons, bridge at Grundy, Va., to Virginia Bridge & Iron Co.

Franklin County, Ky., 980 tons, State highway bridge, to Virginia Bridge & Iron Co.

Chattanooga, Tenn., 1160 tons, buildings for United States Pipe & Foundry Co., to Converse Bridge & Steel Co.

Careyville, Tenn., 345 tons, Cole Creek bridge for Louisville & Nashville Railroad, to Virginia Bridge & Iron Co.

Milton, Va., 235 tons, repairs to Mud River bridge, to Lackawanna Steel Construction Co.

De Soto County, Miss., 220 tons, bridge, to Vincennes Steel Co.

Hancock County, Miss., 150 tons, bridge, to Jones & Laughlin Steel Co.

Bolivar County, Miss., 175 tons, bridge, to Vincennes Steel Co.

Tallahatchie County, Miss., 125 tons, bridge, to Jones & Laughlin Steel Co.

Noxubee County, Miss., 195 tons, bridge, to Austin Brothers Bridge Co.

Chicasaw County, Miss., 110 tons, to Jones & Laughlin Steel Co.

Sharkey County, Miss., 305 tons, bridge, to Virginia Bridge & Iron Co.

Oklahoma City, Okla., 2125 tons, convention hall, to J. B. Klein Iron & Foundry Co.

Wagoner, Okla., 675 tons, bridge, to Virginia Bridge & Iron Co.

Fort Worth, Tex., 600 tons, store building, to Virginia Bridge & Iron Co.

CENTRAL STATES

Cleveland, 110 tons, public library garage, to Patterson-Leitch Co., previously reported awarded to another fabricator.

Cincinnati, Ohio, 540 tons, students' building at University of Cincinnati, to Ingalls Iron Works Co.

Barberton, Ohio, 125 tons, cell house for Pittsburgh Plate Glass Co., to Pittsburgh Bridge & Iron Co.

Lawrenceburg, Ind., 260 tons, distillery buildings, to Ingalls Iron Works Co.

Bridgeport, Ind., 405 tons, bridge, to Central States Bridge & Structural Co.

State of Indiana, 100 tons, two bridges, to central States Bridge & Structural Co.

Dallas County, Iowa, 340 tons, miscellaneous spans, to Pittsburgh-Des Moines Steel Co.

Chicago, 3390 tons, Torrance Avenue bridge, to an unnamed bidder.

South Chicago, Ill., 825 tons, ore and coke structural repairs, to American Bridge Co.

Petersburg, N. D., 200 tons, State highway bridge, to Illinois Steel Bridge Co.

Pike County, Mo., 205 tons, bridge, to Stupp Brothers Bridge & Iron Co.

St. Louis and Jefferson counties, Mo., 750 tons, highway bridge, to Stupp Brothers Bridge & Iron Co.

State of Nebraska, 1130 tons, five highway bridges, to Omaha Steel Works.

State of Nebraska, 640 tons, highway bridges at Emerson and Aurora, to McClintic-Marshall Corp.

Grand Island, Neb., 425 tons, bridge, to McClintic-Marshall Corp.

WESTERN STATES

Winnemucca, Nev., 114 tons, State undergrade crossing, to an unnamed bidder.

State of Wyoming, 111 tons, bridges in Sheridan and Campbell counties, to unnamed bidders.

Bellingham, Wash., 100 tons, addition to normal school, to Isaacson Iron Works.

Albany, Cal., 485 tons, State overhead crossing, to Moore Dry Dock Co.

Palo Alto, Cal., 120 tons, State overhead crossing, to Moore Dry Dock Co.

Tracy, Cal., 175 tons, overhead crossing, to McClintic-Marshall Corp.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Jamaica, N. Y., 2200 tons, building for Sheffield Farms Co.; McClintic-Marshall Co., low bidder.

New York, 1150 tons, Bronx Borough highway; Bethlehem Fabricators, Inc., Bethlehem, Pa., low bidder.

Brentwood, N. Y., 520 tons, Pilgrim State Hospital building.

Washington, 2000 tons, extension to Archives building; McCloskey & Co., Philadelphia, general contractors.

SOUTH AND SOUTHWEST

Louisville, Ky., 4900 tons of structural steel and reinforcing bars, for Louisville & Nashville Railroad; bids to be taken soon.

Yuma, Ariz., 243 tons, tunnel supports on Gila Valley project; all bids returned unopened and contract may not be re-advertised.

State of New Mexico, 700 tons, beam spans.

CENTRAL STATES

Cincinnati, 505 tons, filtration plant.

Rock Island, Ill., 350 tons, junior high school.

Chicago & Northwestern Railroad, 340 tons, bridge at Kenosha, Wis.

WESTERN STATES

State of Montana, 510 tons, four highway bridges.

Butte, Mont., 192 tons, State bridge and viaduct; bids Dec. 20.

Valley County, Mont., 100 tons, State undergrade crossing near Glasgow; bids Dec. 20.

Belton, Mont., 100 tons, State undergrade crossing; bids Dec. 20.

Red Bluff, Cal., 160 tons, State undergrade crossing; bids opened.

Stanislaus County, Cal., 171 tons, State bridge; bids under advisement.

Los Angeles, 4000 tons, assembly plant for General Motors Corp.; bids due at Detroit, Dec. 18.

Bakersfield, Cal., 200 tons, hangars and shop building at County airport; bids opened.

Los Angeles, 8000 tons, Union Terminal Co.'s union passenger station.

Tacoma, Wash., 1000 tons, bridge.

Seattle, 300 tons, State highway bridge.

FABRICATED PLATES

AWARDS

Boston, 1300 tons, Commonwealth pier, to American Bridge Co.

New York, 4500 tons, three municipal ferries, to United Dry Docks, Inc.

New York, 15,000 tons of plates, shapes and bars, trans-Atlantic liner for United States Lines, to Newport News Shipbuilding & Dry Dock Co.

Maurer, N. J., 1080 tons, three tanks, for Barber Asphalt Co., to Chicago Bridge & Iron Works.

Fayetteville, N. C., 110 tons, roof plates and top ring for tank for Gulf Refining Co., to Chattanooga Boiler Works.

Cleveland, 825 tons, spirally welded 30-in. pipe for city water main, to American Rolling Mill Co.

Long Beach, Cal., 1200 tons, six tanks for city, to Western Pipe & Steel Corp.

NEW PROJECTS

New York, 10,000 tons, two tankers for Socony-Vacuum Oil Co.; Sun Shipbuilding & Dry Dock Co., low bidder.

Niagara Falls, N. Y., 500 tons, municipal water pipe line.

Cincinnati, 250 tons, welded pipe for filtration plant.

SHEET PILING

AWARDS

Boston, 2500 tons, bearing piles for Commonwealth pier, to Carnegie-Illinois Steel Corp.

NEW PROJECTS

Muskegon, Mich., 150 tons, PWA filtration plant substructure; bids taken Dec. 12.

Reinforcing Steel

Awards 15,700 Tons—New Projects 7630 Tons

AWARDS

Boston, 175 tons, Commonwealth pier, to Carnegie-Illinois Steel Corp.

New Brunswick, N. J., 250 tons, sewer, to Industrial Engineering Co., New York.

State of Illinois, 400 tons, bridge, to Calumet Steel Co.

Chicago, 325 tons, Dunning Hospital, to Inland Steel Co.

Los Angeles, 14,537 tons, bars for United States Engineers for flood control work, to Los Angeles Iron & Steel Co.

NEW REINFORCING BAR PROJECTS

Jamaica, N. Y., 300 tons, building for Sheffield Farms.

New York, 800 tons, WPA sewer project in Bronx; Rodgers & Haggerty, New York, low bidder.

Washington, 400 tons, extension to Archives building; general contract to McCloskey & Co., Philadelphia.

Louisville, Ky., 4900 tons, including some structural material for Louisville & Nashville bridge.

Jefferson County, Ky., 2500 tons, State grade crossing elimination.

Massillon, Ohio, 255 tons, sewage treatment works; bids Dec. 20.

Mansfield, Ohio, 345 tons, sewage treatment plant; bids Dec. 19.

Rock Island, Ill., 338 tons, armory.

State of Montana, 335 tons, highway projects in six counties; bids opened.

Denver, 198 tons, flumes on South Boulder Diversion conduit; bids Dec. 21.

San Mateo, Cal., 1417 tons, livestock exposition building; all bids rejected.

San Francisco, 242 tons, Agassiz school; all bids rejected.

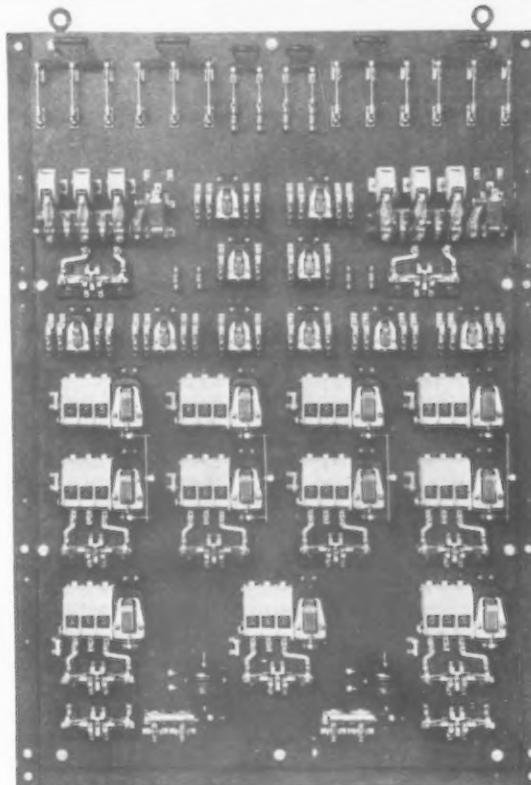
Los Angeles, 777 tons, material for County Purchasing Agent; bids opened.

Los Angeles, 1011 tons, Iron Mountain pumping unit on Colorado River aqueduct project; bids Jan. 14.

State of Oregon, 328 tons, highway projects in seven counties; bids opened.

San Francisco, 192 tons, administration building; bids opened.

CLARK.. AUTOMATIC STEEL MILL CONTROL EQUIPMENT



Clark Alternating Current Magnetic Control Panel for complete control of motors operating a Double Pack Furnace for Sheet Mill Work.



THE CLARK CONTROLLER CO.

1146 East 152nd St.

CLEVELAND, OHIO

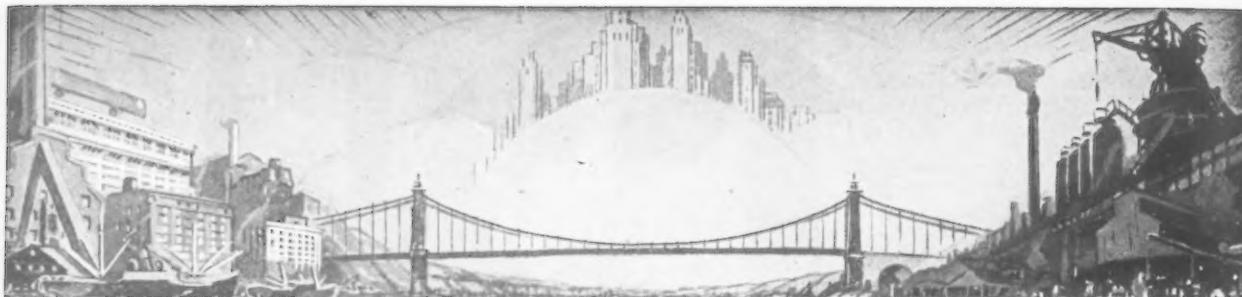


Weirton Employees

Cast Large Vote

MORE than 99 per cent of the employees eligible to vote cast ballots in the annual election of employee representatives concluded Saturday in the Weirton and Clarksburg, W. Va., plants of the Weirton Steel Co.

According to the rules committee a total of 11,250 employees were eligible to vote in last week's election. Of this number 11,158 employees cast ballots, including 3094 eligible voters not working regular turns when the polls were opened. More than 95 per cent of the employees off duty voted, while 99.14 per cent of the total number of eligible voters cast ballots.



Plant Expansion and Equipment Buying

Machine Tool Deliveries Far Ahead Of Sales as Buying Interest Slumps

THE usual year-end disinterest on the part of buyers is giving machine tool builders a chance to catch up on their deliveries. Most of them are running at the best rate for December in six years, but deliveries, even on comparatively small tools are extended for six to eight weeks.

The automotive industry has been placing quietly its press requirements for 1937 models and is believed to have spent \$1,500,000

for this purpose in the last month. It now appears likely that the industry's machine tool buying during the first two months of 1936 will be confined to individual orders to strengthen weak spots in assembly lines. Heavier purchases will come in the second quarter.

A large builder has advanced prices on automatic machines approximately 10 per cent and other companies are expected to follow suit.

Street, New York, Capt. J. H. Tomb, U.S.N., superintendent, plans new machine and engineering shops, machinery hall and other mechanical buildings in connection with new training base at abandoned army post at Fort Schuyler, Bronx Neck, Bronx. Several existing buildings will be remodeled and improved in addition to new structures. Work will begin at once. Fund of \$1,752,000 has been secured for project through Federal aid.

Eastern Tool & Mfg. Co., 129 Bloomfield Avenue, Bloomfield, N.J., has leased about 12,000 sq. ft. in local building for new plant, expanding present capacity. Alfred G. Anderson is president.

Commanding Officer, Frankford Arsenal, Philadelphia, asks bids until Dec. 23 for steel forgings (Circular 239), 21,800 steel forgings and 21,800 windshields (Circular 248), 23,800 brass inlet covers (Circular 255); until Dec. 24, for rheostats (Circular 256).

National Gypsum Co., 111 West Washington Street, Chicago, has approved plans for extensions and improvements in branch plant at York, Pa., formerly operated by Universal Gypsum & Lime Co., Chicago, recently acquired. Cost close to \$50,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 27 for gun mount adapters, ejected case containers and ejected link containers for Philadelphia Navy Yard (Schedule 6708).

State Welfare Department, State House, Harrisburg, Pa., plans installation of new water supply plant and system at State Colony, Selinsgrove, Pa., including pumping machinery and other equipment.

◀ NORTH ATLANTIC ▶

Continental Can Co., 1 Pershing Square, New York, has let general contract to Austin Co., Cleveland, for two-story addition, 120 x 400 ft., to branch plant at Baltimore. Cost close to \$200,000 with equipment.

Scrap Iron Baling Corp., 435-43 Morgan Avenue, Brooklyn, has filed plans for new one-story machine shop. Murray Klein, 65 Court Street, is architect.

American Enka Corp., 271 Church Street, New York, manufacturer of cellulose rayon products, plans extensions and improvements in mill at Enka, near Asheville, N.C., including new equipment and replacements in present machinery. Work will be carried out during 1936. Cost close to \$500,000. A. J. L. Moritz is technical manager in charge.

Glidden Buick Corp., Broadway and 131st Street, New York, representative for Buick automobile, has leased three floors in building at 540 West Fifty-eighth Street, about 40,000 sq. ft., for new branch for storage and distribution, parts, etc.

Central School District, Berlin, N.Y., plans manual training department in new three-story school, for which bids have been asked on general contract. Cost about \$200,000. H. O. Fullerton, 152 Washington Avenue, Albany, N.Y., is architect.

Department of Hospitals, Municipal Building, New York, has taken out permit for two-story power plant on Welfare

Island, 67 x 122 ft. Cost about \$125,000 with equipment. Starrett & Van Vleck, 267 Fifth Avenue, are architects.

Schenley Distillers Corp., 20 West Fortieth Street, New York, has plans for addition to distillery at Lawrenceburg, Ind., to double present capacity. Cost about \$750,000 with machinery. Company will also build new multi-story storage and distributing building at same location, capacity about 100,000 bbl. Cost close to \$300,000 with equipment. Carl J. Kiefer, Schmidt Building, Cincinnati, is vice-president in charge of plant construction.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 27 for fin type steam radiators for Brooklyn, Boston, Norfolk and Mare Island navy yards (Schedule 6704).

Cab Service & Parts Corp., subsidiary of Checker Cab Mfg. Co., 1775 Broadway, New York, manufacturer of taxicabs, has leased four-story building at 311-29 West Sixty-eighth Street, totaling 165,000 sq. ft. floor space, for new factory branch, including parts division, service, maintenance and other departments.

Bagpax, Inc., 220 East Forty-second Street, New York, manufacturer of heavy paper bags for cement, plaster, etc., has work under way for new one-story paper-converting mill in Cullendale district, Camden, Ark., 100 x 300 ft. Cost about \$150,000. Company is a subsidiary of International Paper Co., first noted address.

Board of Directors, New York State Merchant Marine Academy, 80 Centre

Bryant Electric Co., Weaver Avenue, Bridgeport, Conn., manufacturer of electric switches, sockets, etc., subsidiary of Westinghouse Electric & Mfg. Co., East Pittsburgh, plans one-story addition, totaling about 20,000 sq. ft. floor space. Cost about \$70,000 with equipment.

Old Colony Wharf & Coal Co., 114 State Street, Boston, has let general contract to Barney Ahlers Construction Co., 101 Park Avenue, New York, for new coal-handling plant and terminal on waterfront at Providence, R.I. Cost about \$45,000 with equipment. George P. Carver Engineering Co., first noted address, is engineer.

Hampden Brewing Co., North Chicopee, Mass., has let general contract to Daniel O'Connell's Sons, Inc., Holyoke, Mass., for three-story addition, 60 x 135 ft., to brewery in Willimansett district. Cost about \$115,000 with equipment. McClinton & Craig, 458 Bridge Street, Springfield, Mass., are architects and engineers.

Board of Education, Brunswick, Me., plans manual training department in new three-story high school, for which bids

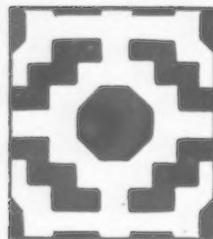
BUILT BY MORGAN
Engineering » »

BUILDING large machinery for other manufacturers, MORGAN Engineering Company itself must have still larger machinery for the job. A trip through the heavy machine shops and assembly rooms in our plants will assure you that whatever the size of machine you need, MORGAN has facilities for its construction. Here is a 1000-ton Hydraulic Flanging Press built by MORGAN for Lukens Steel Company, pressing brake drums for oil well drilling equipment in Lukens' Flanging Department. The drums produced on this press measure $51\frac{5}{8}$ " I. D. x $10\frac{3}{8}$ " deep x $1\frac{1}{2}$ " thick. Lukens operates a battery of MORGAN presses.

THE MORGAN ENGINEERING CO., Alliance, Ohio
Pittsburgh, 1420 Oliver Bldg. New York, 11 W. 42nd Street
Designers and Manufacturers of ELECTRIC TRAVELING CRANES
ROLLING MILL MACHINERY • SPECIAL MACHINERY FOR STEEL MILLS



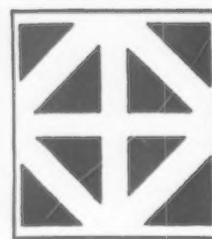
WICKWIRE SPENCER perforated metals



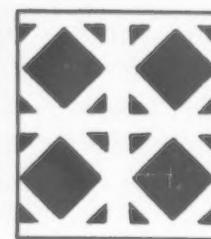
LACECANE



CIRCANE



CROSCANE



WISCANE

The Clinton Works of the Wickwire Spencer Steel Company was the first plant in America to produce perforated metal. It has kept apace with each new development in the art of perforating metals and offers today, a service that is unique in its completeness. A few of the newer designs are shown in the new circular "Decorative Perforated Metals." You will find it of value to you.



WICKWIRE SPENCER STEEL CO.

37 East 42nd St., New York City

Worcester

Buffalo

Chicago

San Francisco

Send for this new Perforated Metals Folder

Division of Purchase, Sales and Traffic, Department of Agriculture, Washington, asks bids until Dec. 27 for four air compressors for Caliente, Nev., and Albuquerque, N. M. (Proposal 3195).

Analy Union High School District, Sebastopol, Cal., has plans for one-story manual training shop, for which superstructure will begin soon. Cost about \$30,000. Louis S. Stone and Henry C. Smith, 785 Market Street, San Francisco, are architects.

Pioneer Sea Foods Co., Eyak, Alaska, plans rebuilding food packing plant and cannery, including storage and distributing building, recently destroyed by fire. Loss about \$175,000 with equipment.

FOREIGN ▶

Colonial Sugar Refinery Co., Ltd., Sydney, Australia, plans new mill on tract at North Queensland, recently acquired for production of fiber board from cane sugar waste. Plant will comprise several one-story units, with power house, machine shop and other mechanical departments. It is scheduled for completion next summer. Cost over \$700,000 with machinery.

Thomas Hedley & Co., Ltd., Newcastle-on-Tyne, England, manufacturer of soaps, washing powders, etc., has plans for additions on adjoining site. Cost close to \$200,000 with equipment.

Vacuum Oil Co., S. I. A., Genoa, Italy, an interest of Socony-Vacuum Oil Co. Inc., New York, has plans for new oil refinery at Naples, adjoining an existing small refinery at that place, previously owned by Petrofina Co. of Belgium. Cost 75,000,000 lire (about \$6,075,000 with equipment).

Cutter-Hammer, Inc., Milwaukee, manufacturer of electrical controlling devices, will pay a bonus of 3 per cent of 1935 earnings to all shop and office employees at the close of this year. The number of beneficiaries is estimated at 2500. The first stockholders' dividend since 1930, amounting to 25c. a share, has also been declared.

British in Row Over Steel Quotations

NEGOTIATIONS are going on among Britain's leading automobile manufacturers and steel producers following Lord Nuffield's recent declaration that the steel industry was taking advantage of the duties on imported steel to charge prices one-third higher than those of foreign competitors on sales to the automotive industry. Incensed by the fact that he had helped the steel producers in their fight for duties, Lord Nuffield has threatened to set up his own steel works and produce all the material required by the Morris automobile works. Lord Nuffield's threat was followed by the decision of the Austin Motor Co. to proceed with the establishment of its own steel works.

So delicate are the negotiations that the Austin concern, second only in size to the Morris company, refuses at this stage to discuss its plans. However, it is known that the Austin company has in mind the construction of a steel plant capable of turning out 100,000 tons annually.

Following Lord Nuffield's statement there came an announcement from the steel trade that a reply would be made in the form of a statement from the British Iron and Steel Federation. This is now being formulated and will contain

a very full explanation of why steel prices have been raised.

A leading automobile manufacturer has summed up the present situation as follows: "The automobile industry will not consider erecting its own steel plants unless the steel industry forces its hand. It is not possible to say more at the moment."

The view of the steel industry has been given by a leading producer thus: "Whatever the statements circulating, it can be taken as certain that we are cooperating with such big consumers as the automobile industry, and intend to continue that cooperation."

Surplus Freight Cars Decline in October

ON Oct. 31 Class I railroads had 208,158 surplus freight cars in good repair and immediately available for service, according to the Association of American Railroads.

This was a decrease of 12,041 cars compared with the number of such cars on Oct. 14.

Surplus coal cars on Oct. 31 totaled 47,728, a decrease of 1555 cars below the previous period, while surplus box cars totaled 125,339, a decrease of 86 cars compared with Oct. 14.

Reports also showed 19,990 surplus stock cars, an increase of 1646 compared with Oct. 14, while surplus refrigerator cars totaled 5652 or a decrease of 944 for the same period.

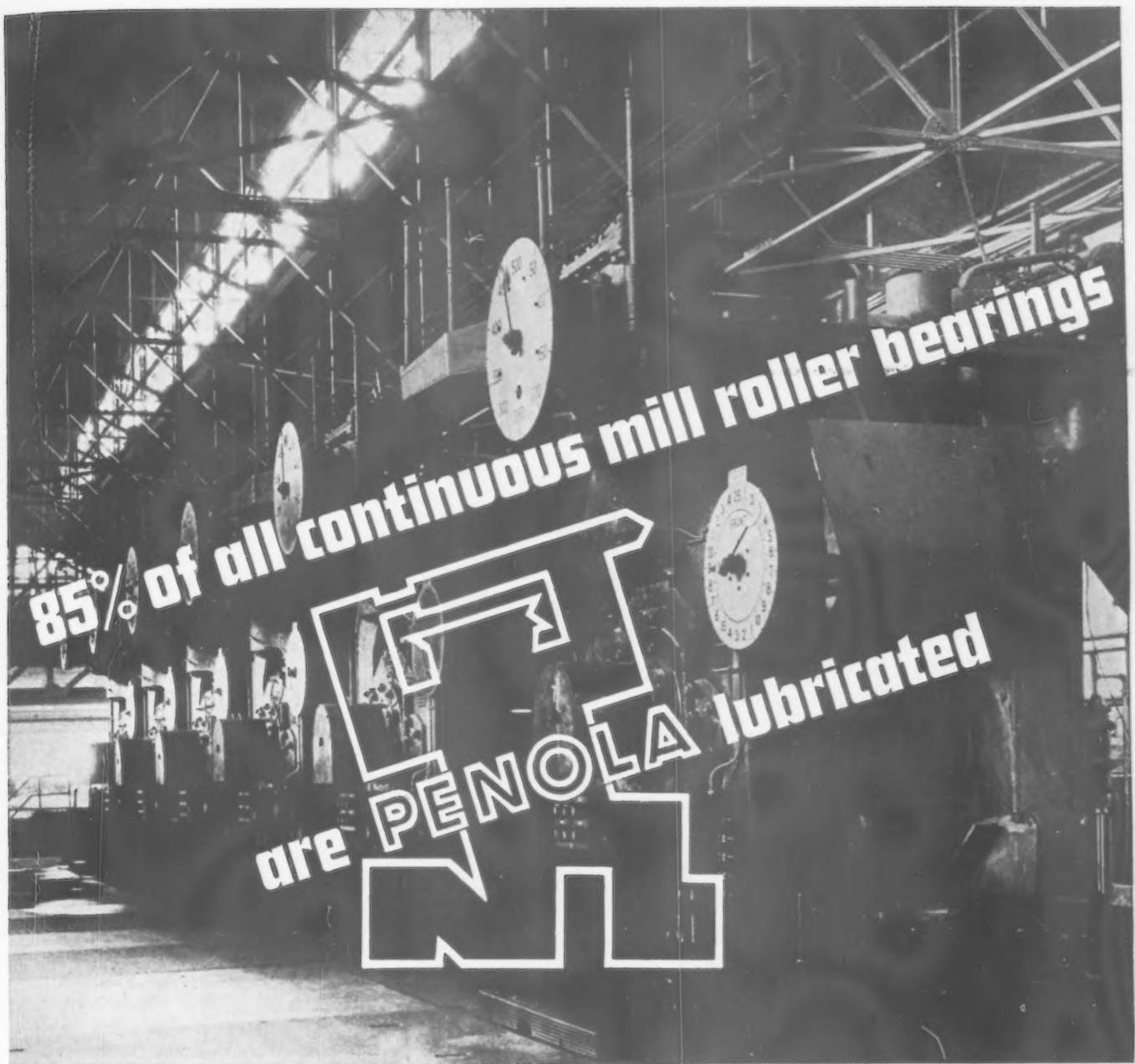
On Nov. 1 Class I railroads had 273,125 freight cars in need of repairs or 15.0 per cent of the number on line, according to the association.

This was a decrease of 11,302 cars compared with the number in need of such repairs on Oct. 1, at which time there were 284,427 or 15.5 per cent.

Freight cars in need of heavy repairs on Nov. 1 totaled 226,431 or 12.4 per cent, a decrease of 4796 cars compared with the number in need of such repairs on Oct. 1, while freight cars in need of light repairs totaled 46,694 or 2.6 per cent, a decrease of 6606 compared with Oct. 1.

Locomotives in need of classified repairs on Nov. 1 totaled 10,187 or 22.3 per cent of the number on line. This was a decrease of 148 compared with the number in need of such repairs on Oct. 1, at which time there were 10,335 or 22.6 per cent.

Class I railroads on Nov. 1 had 3030 serviceable locomotives in storage compared with 3815 on Oct. 1.



THE fact that 85% of all continuous hot strip mills equipped with roller bearings are lubricated by Penola is striking proof of the high performance of Penola lubricants.

When continuous hot strip mills first appeared, the extreme pressures involved called for a new lubricant of much higher film strength than any then in use. In addition, the fine finishes on the costly roller bearings had to be safeguarded against pitting and corrosion. Ladex Lubricant was pioneered and developed by Penola expressly to meet these demands.

Today, with some hot mills rolling wide strip of almost incredible thinness, Ladex is even more essential. It assures the proper roller bearing

lubrication that prevents wear, maintains the rolls in perfect alignment and thus assures continuously accurate material.

Next time you have a lubrication problem, talk it over with a Penola engineer. He'll save you money and valuable time. Make it a rule to rely on Penola, leader in steel mill lubrication for half a century.

PENOLA LUBRICANTS



PENOLA INC.
Formerly
PENNSYLVANIA LUBRICATING CO.
PITTSBURGH, PA.

Grease works operated at
Baltimore, Md.
Baton Rouge, La. - Eldorado, Kan. - Pittsburgh, Pa.

1885 - LUBRICATION FOR THE STEEL INDUSTRY - 1935

THE IRON AGE, December 19, 1935-83

The NEW **WELDIT** MODEL A *Automatic*
WELDING TORCH *with GAS SAVER in Handle*



Thumb controlled Gasaver in handle cuts welding flame to pilot light size instantly when torch is not in actual use. Savings not affected by hose length. No re-lighting, no re-adjusting. Safe and simple to operate.

Send for literature.

WELDIT ACETYLENE CO. 641 BAGLEY AVE.
 DETROIT, MICH.

TEST THIS
WELDING TORCH
 FREE FOR TWO WEEKS
 IN YOUR PLANT

influence the choice of the melting rate is the cost of supplying air to the cupola. When the efficiencies of the mechanical equipment are disregarded, the horsepower for supplying air is obtained by multiplying the volume of the air in cubic feet per minute by the pressure in ounces per square inch and again by the factor 0.0003. Since the pressure increases with the volume of the air delivered to a cupola, the power increases more rapidly than the melting rate. The data given below apply to the operation of a 54-in. cupola.

It has been shown that the cost of power is less for the slower melting rate; however, other conditions may offset this advantage. The requirements for molten metal from a single melting unit may make it necessary to use more rapid melting. A 72-in. cupola has been operated to melt 30 tons of iron per hour, which is equivalent to a rate of 3 min. for burning one coke charge and melting one metal charge. The practice which is generally preferred is to use a combustion rate of 5 min. for each coke charge.

Any changes in the melting rate of a cupola must be accompanied by corrections in the height of the coke bed, if favorable combustion conditions are to be maintained. When the melting rate is decreased by supplying less air, the height of the coke bed is automatically lowered as a result of the formation of carbon monoxide gas. On the other hand, when the air supply is increased, the pressure in the wind belt and hence the velocity of the gases in the coke bed are increased. This causes the region containing free oxygen in the cupola to be raised and makes a higher coke bed necessary in order to avoid the oxidation of the metal charges. The only method of raising the height of the coke bed after the operation of the cupola has been started is to supply extra coke to the subsequent charges. Therefore, it is not good practice to increase the air supply without providing in advance the extra coke needed to build up the bed.

The Control of Cupola Operation

(CONTINUED FROM PAGE 23)

able desulphurizer of the metal. A combination of one part of soda ash and ten parts by weight of limestone is sometimes used as a cupola flux.

The Air Supply

The operation of the cupola furnace requires a continuous supply of fuel and air. The volumes of air required to burn 1 lb. of coke under different combustion conditions have been derived and are given in Table I. Also, the method of computing the weight of one coke charge has been established, and the weights of the coke charges for cupolas of different sizes are given in Table III. From these values, the volume of the air required for the combustion of one coke charge can be readily found.

The amounts of air which will burn one coke charge under combustion condition *F* in cupolas of different sizes are given in Table IV. These values do not take into account any losses in the blast pipe or wind belt.

It is proposed that the rate of burning the coke and melting the metal in a cupola be computed on the basis of the units used in charging the solid materials. This in turn will fix the rate of supplying the air. Different rates of melting can be obtained by changing the air supply to a cupola. In Table IV, the melting rates for cupolas of different sizes are given on the basis of burning one coke charge and melting one metal charge in 4, 5, and 6 min.

One of the factors which should

OPERATION OF A 54-IN. CUPOLA

	Combustion Rate		
	4 Min.	5 Min.	6 Min.
Volume of air, cu. ft. per min.	5,381	4,304	3,587
Average operating air pressure, oz. per sq. in.	20	13	9
Melting rate, tons per hour.	14.2	11.4	9.5
Horsepower required.	32	16	10
Horsepower per ton per hour.	2.3	1.4	1.1

Penetration and Distribution of the Air

The actual conditions of the penetration and distribution of the air supplied to the cupola furnace are often misunderstood. Many designs of special tuyeres have been



Highest Quality

Nicholson Files have teeth that take hold of metal instantly . . . teeth that are made to meet conditions as they actually exist in industrial plants.

Nicholson Files give longer service; they speed up filing operations; they make a good mechanic even more valuable to his employers. Every Nicholson File is made exactly like all other Nicholson Files of its type . . . alike in steel, teeth, shape and appearance.

These things — fast cutting, durability and uniform quality far beyond what you might reasonably expect are what we mean when we say Nicholson Files are "Highest Quality." At hardware wholesalers and mill supply dealers. Nicholson File Company, Providence, R. I., U. S. A.



NICHOLSON
U. S. A.
MADE IN U. S. A.

Genuine

**NICHOLSON
FILES**

A FILE

FOR EVERY PURPOSE

THE
STARTING
POINT of



FORGINGS
CARBON-ALLOY
AND SPECIAL
BASIC ELECTRIC
STEELS



NATIONAL FORGE AND ORDNANCE CO.
IRVINE, WARREN COUNTY, PENNA., U.S.A.

proposed for obtaining greater penetration of the air toward the center of the cupola. Since the coke bed forms an ideal baffle to the directional penetration of the air stream, there is no possibility of forcing the air in a given direction by restricted areas or by special shapes of tuyeres. It has also been assumed that air at low pressure would travel up the lining of the cupola and would not penetrate the bed coke.

The following investigation was carried out to determine the actual distribution of the air within the coke bed of a cupola. Twenty-eight copper tubes $\frac{1}{4}$ in. in diameter were placed in the coke bed of a 32-in. cupola with their ends at seven equidistant positions across the bed and at levels of 14, 20, 26, and 32 in. above the top of the tuyeres. These tubes extended to the outside of the cupola and were connected to water manometers. The entire coke bed containing pieces of coke averaging 3 in. in size was then built up to a height of 48 in. above the top of the tuyeres. A positive-displacement blower driven by a variable-speed motor was used to supply air to the cupola. Four rectangular tuyeres with a total inside area of 95 sq. in. were provided. At a pressure of only 4 oz. per square inch in the wind belt, the pres-

sures across each level of the coke bed were nearly the same with a tendency for slightly higher pressures in the center of the cupola at the lower levels where the measurements were made.

Materials were then charged into the cupola on top of the coke to increase the resistance to the flow of the air. When the pressure in the wind belt was raised to 10 oz. per square inch, the pressures across the bed at each level were practically constant with slightly increased pressures at the center of the cupola. These measurements were made with the air and coke bed at room temperature. Under normal operation of the cupola, other conditions such as the expansion of the gases by heat and the increase in volume due to the formation of carbon monoxide gas will probably influence the distribution of the gases to some extent. However, it could reasonably be expected that the distribution of the gases across the bed of the cupola above the tuyeres when the coke is burning is fairly uniform. The construction of the coke bed is such as to favor the distribution of the air in the cupola except when careless charging or insufficient slagging causes the obstruction of the gas passages through the bed. On the basis of the results obtained from the investiga-

tion described above, there is little prospect of any advantage to be gained in the distribution of the air by restricting the area of the cupola above the tuyeres or by reducing the size of the tuyere openings.

Manufacture of Copper Tubing

(CONTINUED FROM PAGE 27)

at the rate of about 4000 cu. ft. an hour, which is sufficient to develop a slight pressure and thereby prevent the entrance of outside air.

Each coil, before entering the furnace, has its interior purged by this same gas, admitted under a pressure of approximately 25 lb. per sq. in. Thus there is no possibility of oxidation either inside or outside the tube during the anneal. Straight lengths of pipe are self-purged, due to the stack effect and the excess pressure inside the furnace. Furnace heating elements are located above and below the alloy mesh belt which carries the tubing through the furnace. A series of fans throughout the heating chamber of the unit assures uniform temperature distribution and more rapid heat transfer.

After emerging from the discharge end of the furnace, the tubes are cooled to avoid oxidation or tarnishing. This is accomplished by means of a cooling zone, roughly twice the length of the furnace proper. This zone is also equipped with fans to accelerate cooling. The reduction in this zone is to approximately room temperature.

All of the tubing used to carry refrigerant must be entirely free of moisture, or, in other words, dehydrated. Tubing emerging from the bright annealing furnace is entirely free of moisture both inside and out. The ends, therefore, are immediately flattened and sealed with solder in order to maintain this dehydrated condition inside the tube.

Blaw-Knox Co., Pittsburgh, has declared special dividend of 10c. a share on its outstanding no-par value capital stock, payable Jan. 2, to stockholders of record Dec. 14. Last dividend paid by company was in March, 1932, which was 12½c. a share.

East Eng.
Library

THE IRON AGE

DECEMBER 26, 1935

DEC 26 1935

Lavino FERRO MANGANESE

E.J. LAVINO & COMPANY

OGLEBAY-NORTON
AND COMPANY

LAKE SUPERIOR IRON ORES

BESSEMER

MANGANIFEROUS

NON-BESSEMER

HIGH PHOSPHORUS

LUOSPAR

OID LUMP—98 & 1%

O.I. LUMP—95 & 1.50%

O.2 LUMP—85 & 5%

ASHED GRAVEL—85 & 5%

ROUND—

ENAMELERS GRADE

95—98 & 2 1/4%

ROUND—

CLASS MAKERS GRADE

95—98 & 2 1/4%

FERRO ALLOYS

FERRO-SILICON

95—98—10—5%

FERRO-CHROME

HIGH AND LOW CARBONS

SPIEGELEISEN

LAICO BRAND—14—21%

LAICO-SPIEGEL

LAICO-MANGANESE

PHOSPHATE ROCK

SPECIAL FURNACE SIZE

COAL

STEAM—GAS—BUNKER

CHARCOAL

WRIGLEY HARDWOOD

LUMP—BULK—

BURLAP BAGS

HOT TOPS

'C & D'—

FOR INGOT MOLDS

LAKE TRANSPORTATION

THE COLUMBIA

TRANSPORTATION

COMPANY

OGLEBAY
nORTON
AND COMPANY

HANNA BUILDING, CLEVELAND, OHIO

PITTSBURGH OFFICE

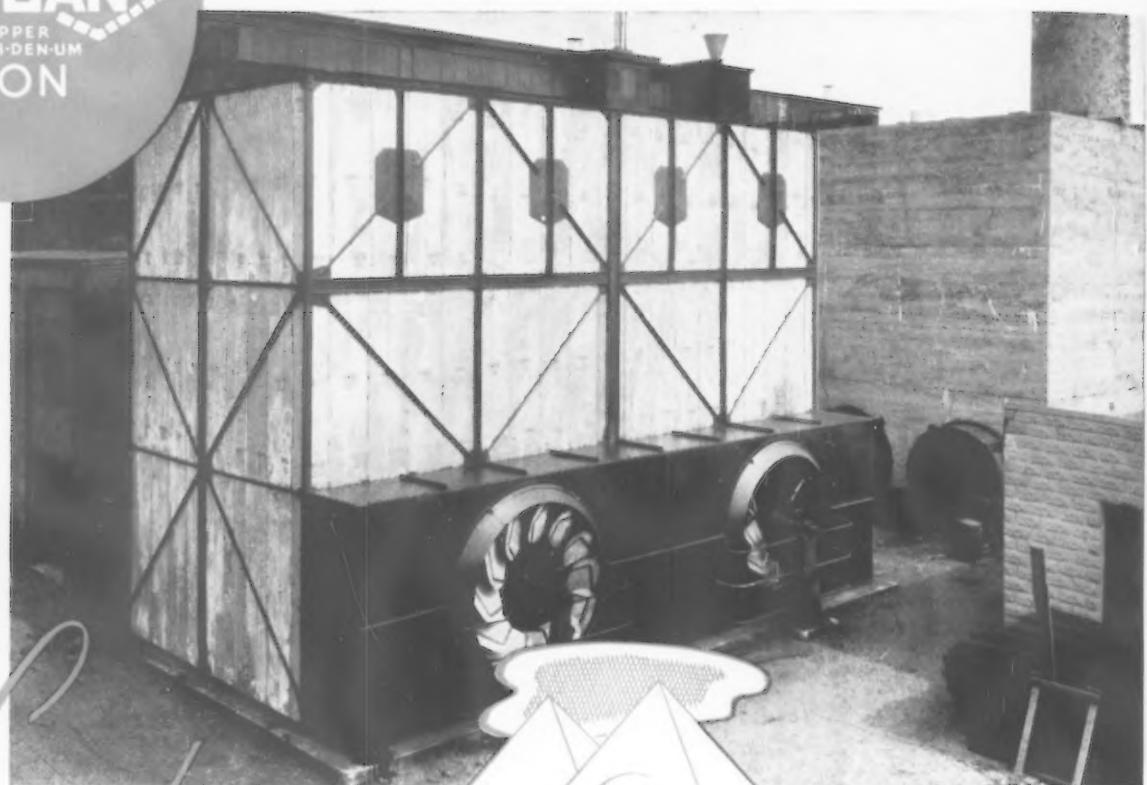
1842 OLIVER BLDG.

CHICAGO OFFICE

208 S. LA SALLE STREET



EXCLUSIVE SALES AGENT



Long-lasting UNDER ADVERSE CONDITIONS

Sheet metal is a mighty handy material to have around. It safeguards life. It protects valuable equipment. It confines heat and cold and directs them to the point where they are needed. It serves a thousand uses, because it is so adaptable.

But don't neglect, when you are using it, to think about these things. You have paid good money for the metal itself. You are spending more money to fabricate it. You are using it to do a definite job, and you want it to last even under adverse conditions where weather, steam, moist air, chemical

fumes or a combination of destroying forces will pick it to pieces.

Where such conditions exist, the logical answer is Toncan Iron—the alloy of refined open hearth iron, copper and molybdenum with the highest corrosion-resistance of any ferrous material in its price class—the sheet metal that is being used today in homes, factories and public buildings wherever long service and low yearly cost are given the consideration they deserve.

"The Path to Permanence" is a book that will interest you. Write for a copy.



Republic Steel
CORPORATION

GENERAL OFFICES · YOUNGSTOWN, OHIO

2—THE IRON AGE, December 26, 1935

THE IRON AGE, published every Thursday by the CHILTON CO., (INC.), Chestnut & 56th Sts., Philadelphia, Pa. Entered as second class matter November 8, 1932, at the Post Office at Philadelphia under Act of March 3, 1879. \$6.00 a year in U. S., Canada \$8.50, Foreign \$12.00. Vol. 136, No. 26.